NEW GAME BOY • SNES • COMMODORE 64 • MEGA DRIVE • AMIGA • PS ONE

retro GAMER

ULTIMATE RETRO HARDWARE GUIDE

REDISCOVER THE GREATEST VIDEO GAME MACHINES EVER MADE

Digital Edition

FUTURE

FIFTH EDITION

CONSOLES • COMPUTERS • HANDHELDS

WELCOME TO THE ULTIMATE RETRO HARDWARE GUIDE

As much as we love playing video games it's important to remember that it's impossible to enjoy them without the very machines they appear on. Ever since the late Seventies various companies from all around the world, including Sony, Atari, Nintendo, Sega, Sinclair and Commodore, have been in an arms race to create the most exciting, most powerful games machines of all time. Some of these systems have fallen by the wayside, forgotten by all but the fiercest of fans, while others have gone on to shape our childhood memories and help define the industry itself. Our latest book not only looks at some of **Retro Gamer** readers' most favourite consoles and computers but also goes one better, examining some of these classic systems and revealing how they were created. You'll discover how machines like the Commodore 64, Xbox and NES were made, learn how the Amiga 500 rose to power, and find out why there's still so much love for the humble ZX Spectrum. Better yet, there's a plethora of fantastic photography of your favourite machines and peripherals, meaning our latest book is a feast for the eyes as well as the mind. We hope you enjoy it.

FUTURE

ULTIMATE RETRO HARDWARE GUIDE

Future PLC Quay House, The Ambury, Bath, BA1 1UA

Editorial
Editor **Darran Jones**
Senior Designer **Adam Markiewicz**
Compiled by **April Madden & Adam Markiewicz**
Senior Art Editor **Andy Downes**
Head of Art & Design **Greg Whitaker**
Editorial Director **Jon White**

Photography
All copyrights and trademarks are recognised and respected

Advertising
Media packs are available on request
Commercial Director **Clare Dove**

International
Head of Print Licensing **Rachel Shaw**
licensing@futurenet.com
www.futurecontenthub.com

Circulation
Head of Newstrade **Tim Mathers**

Production
Head of Production **Mark Constance**
Production Project Manager **Matthew Eglinton**
Advertising Production Manager **Joanne Crosby**
Digital Editions Controller **Jason Hudson**
Production Managers **Keely Miller, Nola Cokely, Vivienne Calvert, Fran Twentyman**

Printed by William Gibbons, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

Distributed by Marketforce, 5 Churchill Place, Canary Wharf, London, E14 5HU
www.marketforce.co.uk Tel: 0203 787 9001

Ultimate Retro Hardware Guide Fifth Edition (GAB4270)
© 2022 Future Publishing Limited

We are committed to only using magazine paper which is derived from responsibly managed, certified forestry and chlorine-free manufacture. The paper in this bookazine was sourced and produced from sustainable managed forests, conforming to strict environmental and socioeconomic standards. The paper holds full FSC or PEFC certification and accreditation.

All contents © 2022 Future Publishing Limited or published under licence. All rights reserved. No part of this magazine may be used, stored, transmitted or reproduced in any way without the prior written permission of the publisher. Future Publishing Limited (company number 2008885) is registered in England and Wales. Registered office: Quay House, The Ambury, Bath BA1 1UA. All information contained in this publication is for information only and is, as far as we are aware, correct at the time of going to press. Future cannot accept any responsibility for errors or inaccuracies in such information. You are advised to contact manufacturers and retailers directly with regard to the price of products/services referred to in this publication. Apps and websites mentioned in this publication are not under our control. We are not responsible for their contents or any other changes or updates to them. This magazine is fully independent and not affiliated in any way with the companies mentioned herein.

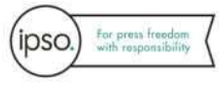
Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR)
www.futureplc.com

Chief executive **Zillah Byng-Thorne**
Non-executive chairman **Richard Huntingford**
Chief financial officer **Penny Ladkin-Brand**

Tel +44 (0)1225 442 244

Part of the

bookazine series



CONTENTS

FEATURES

08 THE ALL-TIME GREATEST GAMES SYSTEMS
Retro Gamer readers reveal the best games machines of all time. How many did you own?

40 THE HISTORY OF APPLE
Discover how Apple has continually shaped its hardware over the years, from the Macintosh to the iPad

48 ATARI 2600
Developers celebrate Atari's first ever home console and the impact it had

58 ZX SPECTRUM
We look at the publishers, developers and people that defined Sir Clive Sinclair's 8-bit home computer

68 COLECOVISION
Discover how Coleco went up against big companies like Nintendo and Atari

74 COMMODORE 64
Learn how Commodore improved on its earlier systems and made one of the best-selling home computers of all time

82 NES
Masayuki Uemura reveals how he created Nintendo's massively popular games console

100 AMIGA 500
Kim Justice speaks to various game developers to discover how Commodore's 16-bit computer ruled the roost

116 MEGA DRIVE
We speak to key Japanese developers to find out what made Sega's 16-bit console so special to a generation of gamers

126 GAME BOY
Everything you ever needed to know about Nintendo's portable pocket console

136 SNES
We celebrate one of the greatest games machines of all time

148 NEO-GEO
Fans reveal why SNK's first entry into the home console market remains so desirable

170 PLAYSTATION
Learn how Sony's first console went on to dominate the world

196 XBOX
How Microsoft made its first games console

HARDWARE HEAVEN

56 INTELLIVISION
Your instant guide to Mattel Electronic's first home games machine

92 AMSTRAD CPC 464
We take a look back at Amstrad's entry into the lucrative 8-bit market

94 MASTER SYSTEM
A brief look back at Sega's 8-bit alternative to Nintendo's massive popular NES

98 SPECTRUM +2
Find out what happened when Amstrad purchased the rights to the Spectrum

110 ATARI ST1040
We take a brief look back at Atari's upgraded home computer

134 LYNX
A quick guide to the world's first ever console with a colour screen

146 GAME GEAR
Sega was late to market with its own portable handheld, but many still loved it

162 JAGUAR
We take a look back at the console that failed to take on Sony's PlayStation

164 AMIGA CD32
The Commodore console that burned brightly but ever so briefly

168 SEGA SATURN
Your instant guide to Sega's follow-up to its widely successful Mega Drive

184 NINTENDO 64
The console that went with 64-bit power when everyone else was focusing on 32-bit

188 DREAMCAST
We take a look back at the last ever home console made by Sega

192 PLAYSTATION 2
Sony's follow-up to its PlayStation became the best-selling games machine of all time

PERIPHERAL VISION

66 INTELLIVOICE
Does anyone else remember this utterly bizarre add-on for the Intellivision?

80 COMPETITION PRO JOYSTICK
If you played games that required a lot of waggle this was the joystick that you really needed to own

96 LIGHT PHASER
If you owned a Sega Master System this cool lightgun was essential

112 NES ADVANTAGE
The NES control pads weren't for everyone, so this chunky joystick was a good alternative

114 CONTROL STICK
Only Sega will know why it decided to make this rather weird controller

160 SUPER SCOPE
Pretend you were using a rocket launcher with Nintendo's crazy peripheral

166 SUPER GAME BOY
The cool little device that made all your Game Boy games look awesome

186 G-CON 45
We look back at the fantastic lightgun that came bundled with *Time Crisis*

190 DANCE MAT
Surely we weren't the only ones who got sucked in by this dance craze?

206 STEEL BATTALION CONTROLLER
You'll never witness a game peripheral that's as crazy as this one

SUPER MARIO 3
SUPER MARIO 2
Nintendo

48

196

16-BIT
SEGA

100
AXIS

THE AL GREA GAME S

RETRO GAMER READERS REVEAL THE BEST MACHINES OF ALL TIME. HOW MANY DID YOU END UP OWNING?

We love videogames, games are fun. They can take you to far-off worlds and let you shoot down entire space fleets; they allow you to find ways to save mankind or ways to quash it, and they let you play the hero, or the villain. For many of us they have helped define our childhoods, or even led us to our careers. And yet videogames would be nothing without the hardware that they run on, so we wanted to kick off our first issue of 2018 by celebrating the greatest game systems of all time.

We asked you to rank your top ten favourite gaming systems, and the results were interesting with 94 systems voted for from 35 different manufacturers. The top five

L TIME

TEST YSTEMS

manufacturers will come as no surprise to long-term readers, but what is interesting is that no single company had all its machines appear in the final top 30. It's also important to remember that this isn't our list, but *yours*. We collated a staggering amount of votes from the **Retro Gamer** readership in order to discover what you feel are the greatest machines of all time. Some of your choices raised eyebrows with us, as we're sure they will with you, and certain systems simply didn't amass enough points to make the final list, but it nonetheless gives a great insight into what you, the readers, enjoy as the magazine continues to evolve (some of the featured machines were considered cutting-edge systems when **Retro Gamer** first hit the shelves in 2004).

To ensure things stay nice and retro-orientated you'll not find any new systems in this updated list, with the PS2, GameCube and Xbox being the last generation to be featured. You probably won't be too surprised by the top spot, either, but you may be surprised to learn that it was heavily contested to the bitter end, by one of its fiercest rivals. The rest of this book looks at some of your final 21 systems in more depth, while revealing plenty of other great machines and peripherals you should own. Enjoy the list.

Your say

NOT AS EXPENSIVE AS THE C64 OR AS CHEAP AS THE SPECTRUM, BUT IT HAD THE **BEST OF BOTH WORLDS** – AND IT DID WELL ENOUGH FOR AMSTRAD TO ACTUALLY BUY OUT SINCLAIR ENTIRELY"

– gunbladelad

21 AMSTRAD CPC 464

THE ALL-IN-ONE UNDERDOG

TURN TO **PAGE 92** TO LEARN MORE ABOUT THE AMSTRAD CPC 464

MANUFACTURER: **AMSTRAD** | YEAR: **1984**

■ **Despite being an all-in-one answer to the Commodore 64 and ZX Spectrum, Lord Sugar's machine still found itself trailing behind its peers, which explains why it's so low down on your list.** Having said that, everyone loves an underdog, which probably explains why it still managed to break into your top 30.

Philip and Andrew Oliver,

Former Amstrad programmers

What did you think about Amstrad entering the computer market?

Philip Oliver: We really liked the computer and thought it was a great opportunity for us to make many games on, with far less competition from the top game developers on Spectrum, C64 and the BBC Micro.

How did the Amstrad compare to its rivals?

Andrew Oliver: We loved the real keyboard, disk drive and monitor – it was a very good package for a fair price. Having its own screen meant most people gave it a dedicated setup, and didn't have to contend with a poor quality RF (aerial) signal and fuzzy display. We were quick to buy a plug-in Z80 assembler, called Maxam, that gave us the ability to write very fast arcade-style games in assembler.

So, despite a lot going for it, why do you feel the Amstrad was less popular than its 8-bit peers?

PO: It was less popular than the Spectrum and C64 because it came a couple of years later and was more expensive. But because it was a complete package, most buyers would tell you it was worth the extra, and they were quick to defend their purchase against the more popular Spectrum and C64. Fundamentally, the Amstrad was a souped-up Spectrum, running the same Z80 CPU with a variety of graphic modes and a little more RAM.

How did Dizzy benefit from appearing on the Amstrad?

AO: The Amstrad was a less crowded market with fewer established names. As a result it was easier for the new guys like us to break in – and break in we did! Dizzy was seen by many as the mascot character for the Amstrad, because we always prioritised the Amstrad version to the ported versions as it was always the first and had slightly more colours, no colour clash and better music.

The Amstrad has a vibrant community today, why do you think it still strikes a chord with its fans?

PO: People who bought the Amstrad, had a complete, easy-to-use, computer. There was no sharing of the TV and no messing with cables. It was there to be switched on and instantly enjoyed.

Your say...

"I CAME TO THIS LATER THAN THE REST, BUT **NEO TURF MASTERS, SHOCK TROOPERS AND NEO DRIFT OUT** ARE IN MY ALL TIME TOP TEN GAMES ON ANY SYSTEM"

- ulala

20 NEO-GEO AES THE ARCADE COMES HOME

MANUFACTURER: **SNK** | YEAR: **1990**

■ **Legendary for both its price and power, SNK's luxury machine achieved mythical status due to its arcade-perfect games, including a huge number of one-on-one fighting games.** Few can afford to seriously collect Neo-Geo games, but those that do take the plunge quickly become devotees, explaining the machine's appearance here.

Yasyuki Oda, *Producer at SNK*

The Neo-Geo featured powerful, arcade-quality hardware and a high price. Why did SNK choose this approach when designing it?

As you mention, we wanted our fans to play our games at home with the best arcade quality, just as they experienced at their local arcade centre. As a result of this, the prices for both the games and the Neo-Geo hardware were quite expensive.

Why were so many fighting games released on the system?

In those days, the fighting game genre was the most successful genre in terms of profit in the arcade market. As a result of that, the company decided to focus on the development of fighting games. The development team spent most of their time developing games for the MVS system. That meant we did not get many chances to develop other game genres for other platforms.

Why do you think players stayed with the hardware for so long?

We really feel grateful that we were able to continue to release our titles until 2004, and we have the support of our amazing fans to thank for that. Around 2000 to 2003, SNK went into bankruptcy and there was a very distinct lack of both human resources and equipment. Even during that situation, we managed to continue to develop Neo-Geo games for our fans.

Which games do you feel best represent the Neo-Geo as a whole?

In my opinion, it would be *Art Of Fighting*, which released as our first '100 Mega Shock' title.

Why do you think Retro Gamer's readers still think highly of the Neo-Geo?

Neo-Geo simply had a very long production run. We believe the fact that we supported the hardware for so long helped to leave a strong impression on our fans.

Alex Trowers, *Ex Bullfrog designer*

What was your first memory of encountering the Neo-Geo?

It was playing *World Heroes II* at Laserquest in Guildford. Well, that and seeing lovely shots of Viewpoint in magazines. I bought one shortly afterwards when I realised (mistakenly) that my salary would allow me the freedom to buy these games.

Did the Neo-Geo deserve its luxury status?

Absolutely. It was an arcade machine for your home.

Why do you think so many of the system's games remain so desirable today?

Exclusivity. On a related note, if anyone sees a *Samurai Shodown IV* for the Neo-Geo CD at a reasonable price, do please let me know!

What do you think is the Neo-Geo's legacy?

It's got to be the beat-'em-ups. Sure, none of them ever really captured the mainstream attention of *Street Fighter*, but the wealth of characters and interesting systems still prevail today.

TURN TO **PAGE 148** FOR OUR FULL LOOK AT SNK'S CLASSY CONSOLE

19 PC ENGINE FILLED WITH EASTERN PROMISE

MANUFACTURER: **NEC** | YEAR: **1987**

■ **This tiny console designed, by Hudson Soft, boasted amazing arcade conversions and many excellent shoot-'em-ups, as well as the first CD-ROM add-on.** If its American release as the Turbografx-16 had met success, it could well have done on this list, but importers were more than sufficiently impressed to vote the system in.

John Brandstetter, *Formerly of NEC and Turbo Technologies, Inc*

What were the best things about the PC Engine/Turbografx hardware?

The PC Engine had an amazing small size, and a high performance display processor with the ability to do very large sprites for the time. It was the dominant game system in Japan because it had a huge library of excellent arcade ports – it was the ultimate arcade game console for its time.

How important was it to be the first platform with CD technology?

At Hudson, we had been the innovator of this technology and it allowed us to bring games out faster. Initially, the games benefited from better game audio, and later we had better, bigger games – we could fit hundreds of cartridges of data on a CD. Being first in Japan was a huge success as almost all the best games are CD games in Japan.

What do you think was the main thing that prevented the US Turbografx from achieving the same success the PC Engine had in Japan?

I was in the trenches with this. Money to licence games for the USA was a big problem. Many of the Japanese games that would do very well in the USA today – anime, RPGs, etc – seemed to be a niche, and we survived for a while catering to that niche. But it was very hard to convince marketing at NEC America to do this. We basically had TV and VCR people selling our products.

This began to change when we formed Turbo Technologies, Inc, which allowed us to have our own game-focused sales teams. But this again was a bit of a problem, as TTI was not as well funded as Nintendo and Sega. So, we lost out on big titles like *Street Fighter* and many others. Even though many of these titles existed in Japan and are amazing, being a US division we had to do things separately from Japan and could not offer the cash that Sega or Nintendo could to third parties.

How did it feel to know you were going to be the face of the TurboDuo ad campaign?

Tony Ancona and I had kind of come up with this when we met with our marketing company. We wanted to do a similar thing to what had been done in Japan, as Hudson's hero for the system was Takahashi Meijiin (or Master Higgins). This is how it came about, and Tony and I became the mascots of the TurboGrafx brand. Most people in the industry know me as Johnny Turbo, and I am pretty okay with that.

What are your favourite games for the PC Engine and Turbografx systems?

R-Type, Castlevania, Bonk, Gate Of Thunder, Lords Of Thunder, Bloody Wolf, Gunhed, Legendary Axe, Splatterhouse, Bomberman, Galaga '88 and many more.

Matt Risley, *Artist formerly of System 3 and Argonaut Software*

Could you tell us about your first encounter with the PC Engine?

It all definitely started with my mate Dave Langley. I remember us travelling into London to a shop which sold imports. It was an incredible shop of goodies. That day Dave got a PC Engine and quite a few games. I remember unpacking it and wondering what this little white machine could do. Once we switched it on, I was hooked!

Why do you think games magazines at the time were so excited by it?

I don't think anyone could believe the screenshots in the magazines and that this was an 8-bit machine. We'd also never seen sprites so large before. We had never seen anything like that at home, it was like being in the arcades!

You've got a large PC Engine collection, what is it you like about the system?

It is my favourite console for sure. What I love is the variety of the games, pretty much all of the games were really colourful and beautifully designed.

How do you think it stacked up compared to the home systems of the time?

At the time it was head and shoulders above any system. All my friends had a Master Systems, but once they saw the PC Engine games in the magazines, everyone really wanted it, but I remember many were put off with it being an import and the difficulty in getting hold of the games.

Fun fact

THE PC ENGINE IS THE ONLY MACHINE IN YOUR TOP 21 THAT **NEVER RECEIVED AN OFFICIAL RELEASE IN THE UK**

Your say...

SO MANY ARCADE GAMES! HOW DID THEY MAKE ARCADE-PERFECT GAMES ON AN 8-BIT SYSTEM?!"

- Treble

18 XBOX BIG IS BEAUTIFUL

MANUFACTURER: **MICROSOFT** | YEAR: **2001**

TURN TO **PAGE 196** FOR OUR FULL LOOK AT HOW THE XBOX WAS CREATED

■ **Microsoft's debut console was powerful and had incredible financial backing, but never became a market leader.** Regardless, the console found an audience that champions it to this day, thanks to the allure of gaming over broadband on Xbox Live and games like *Halo, Fable, Ninja Gaiden* and *Project Gotham Racing*.

Seamus Blackley, *Xbox codesigner*

You previously mentioned that Microsoft jumping into the console market was "fucking ludicrous", so how do you think it all worked out in the end?

It worked out because it was pure. Up until the thing got approved and we really started staffing up, Xbox was less than ten guys, all passionate gamers who knew this was going to work – we clearly saw this was going to work, it was not in question. It was like the kind of fervour you can usually only get from religions. We would literally go through schedules and be like, 'Hey, Craig Mundie is having a meeting about a consumer device and there's a budget for it,' and we would just turn up to the meeting with our demo, uninvited. We learned every Microsoft building and sampled every cafeteria, and drove around in our various cars – I had a red pickup truck, because our demos were pretty big, and we'd put it in the back and ride around with everyone in the back of the pick-up, even in light rain. It was absolutely renegade.

I remember going with Kevin [Bachus] to Tokyo Game Show, we rode the train in and when we got out, the entire train station was plastered with Xbox logos. We got there and we just started crying. It was the DirectX Box and then the Xbox and had this silly X logo and it's all in this colour green, because Horace Luke only had green left after everyone stole his markers. We're remembering all of these fucking improbable things, and all the guys telling us it wouldn't work in Japanese publishers and US publishers, and Microsoft guys trying to shut it down. And then we're in a subway station in a foreign country and it has this logo which is like a joke to us, but it's everywhere and it's a serious thing. It was absolutely crazy. I still don't quite believe it.

Fun Fact

READERS WHO VOTED FOR THE XBOX, WERE 50% MORE LIKELY THAN AVERAGE TO VOTE FOR THE XBOX 360 AND XBOX ONE

17 MASTER SYSTEM
THE ARCADE MASTER

MANUFACTURER: **SEGA** | YEAR: **1985**

■ **During the late Eighties, Sega carved out its own slice of the console world with conversions of hot arcade games including *Hang-On*, *Shinobi*, and *Wonder Boy*.** This powerful 8-bit system was particularly popular in Europe and South America, and survived well into the Nineties as a cheaper alternative to the Mega Drive.

Mark Cerny, *Former Sega programmer/designer*

You spent some time at Sega working on the Master System, Mark, what do remember from that period?

For me, when I think back to the Master System, what I remember is... *fun*! I transitioned from arcade games to console games just as it was coming out, so it was the first console I ever programmed. It was amazingly fast to get up to speed on it – the manual was a few dozen pages of handwritten instructions, and there were *so* many tricks you could use once you had familiarity with the hardware.

Of course, the rest of the world was more focused on playing the games than creating them. The Master System did have a broad collection of games, from quirky to outstanding. Some of these titles, such as *Alex Kidd*, were created by names you probably wouldn't recognise today. But the Master System was also the training ground for huge talent, such as Yuji Naka. If memory serves, he was responsible for the ports of Sega's biggest arcade titles while still finding time for amazing original work, such as *Phantasy Star*.

After I pitched the Master System's 3-D glasses to management and prototypes were floating around the office, I came back from the new year break to find that Naka had programmed a full blown 'canyon run' flight simulator, in 3D! Quite impressive. The only bad news being that in order to keep the framerate up, he had to shrink the size of the screen to the point where the graphics were just a postage stamp-sized area in the centre of the TV, and the rest was black. He volunteered that it was a bit too small, asked if I shared his opinion, and then reluctantly dropped the project. What a talent, though!

TURN TO **PAGE 94** FOR OUR LOOK BACK AT SEGA'S 8-BIT CONSOLE

Your say

MY FIRST CONSOLE. I USED TO BE JEALOUS OF MY MATE SO BEGGED MY PARENTS FOR ONE. SONIC IS STILL BETTER ON THIS THAN THE MEGA DRIVE"

- kebabinho

Your say...
MY FIRST REAL LOVE. AFTER THE PONG CLONE, TO HAVE A VCS WITH SO MANY ARCADE GAMES AT HOME SEEMED LIKE LUXURY AND THE FUTURE"
- kiwimike
Q*BERT™
ATARI® 2600™
game program™
adventure
CX-2613-P
3 SKILL LEVELS
Program © 1980 ATARI, INC.
Use with Joystick Controllers
ATARI®
Fun fact
VOTING FOR OTHER ATARI SYSTEMS WAS 45% HIGHER THAN AVERAGE AMONG THOSE WHO INCLUDED THE ATARI 2600 IN THEIR TOP TENS

TURN TO **PAGE 48** TO LEARN MORE ABOUT ATARI'S FIRST HOME CONSOLE

16 ATARI 2600 THE BIRTH OF AN OBSESSION

MANUFACTURER: **ATARI** | YEAR:**1977**

■ **The oldest machine to make it into your list was a phenomenon, selling millions and remaining viable for over a decade.** Atari's power in the arcade industry provided the system with ready-made hits, and the company innovated by licensing additional games from its arcade rivals, including the million-selling *Space Invaders*.

Nolan Bushnell *Atari Inc cofounder*

Are you surprised the Atari 2600 continues to attract attention today?
I am somewhat surprised, although the games for the Atari 2600 were well designed, even though the graphics were primitive.

Did the Atari 2600 achieve everything you set out to fulfil at the time?
It heavily exceeded my expectations. When the system was initially designed we thought it would get up to 20 cartridges at most and I felt the machine would have a three-year life. We thought it would need to be replaced with better hardware and more memory within that time frame. Warner thought it was a record player and it only wanted to focus on cartridges.

Of all the games for the Atari 2600, which were your personal favourites?
I really liked *Combat* and later on I enjoyed *Pitfall!* – even though it was not an Atari label game. *Combat* was the most successful.

What tricks could the Atari 2600 pull off that set it apart from its rivals at the time?
We had no real rivals until much later, but the platform was amazingly flexible.

What aspect of the machine's development did you most enjoy?
I enjoyed the early design aspects. The trickiest part was keeping the costs down to be able to hit sub-$200.

What do you think about the plans to launch a new Atari console – the Ataribox?
It's predictable. I'm happy to see the brand has traction.

Allan Alcorn *Designer of Pong*

What do you think makes the Atari 2600 so revered today?
Few consumer products can claim a dedicated following for 40-plus years. I think it is still loved due to it being the first popular game platform and because many new games were first on that platform. It also helped that the initial design goal was to have the lowest manufacturing cost.

We think we know the answer, but as a project, would you say the Atari 2600 was a success?
The Atari 2600 was a very successful project. The hardware architecture was very cost effective, the programming model was very primitive and the machine met FCC emission rules. But it had greater flexibility than we expected as well.

What did the Atari 2600 have that made other games systems shiver in fear?
There was no frame buffer and there was very little support hardware, so it meant the programmers could be more creative.

We asked Nolan this and he said *Combat*... what's your favourite Atari 2600 game?
My personal favourite game for the Atari 2600 is *Chess*. It was technically very challenging to create a very good chess algorithm in 2K of ROM and 128 bytes of RAM, and displaying that many objects on the screen. It was probably our least successful game, though.

Let's go back to when you were making the 2600, what was your standout achievement back then?
My most biggest achievement on the project was putting the teams together of 'all-A' players. Steve Mayer and Ron Milner created the prototype in three months, while Jay Miner led the chip effort. We also had the top product team from National Semi which was led by John Ellis.

Has anything else come running back to you?
I remember going over to consumer engineering on Monday mornings to see who got injured that weekend, because most of the hardware engineers were into motocross and would often break and arm or leg.

15 PC THE ETERNAL PLATFORM

MANUFACTURER: **VARIOUS** | YEAR: **1981**

■ **As home consoles rise and fall throughout countless generations, the PC remains a constant in the market, through big-boxed floppy disk games to today's era of digital distribution.** For many of you, the era that evokes the most nostalgia is that of DOS games running on 486 processors, but we're celebrating everything to do with PC here – all the way through to digital platforms like Steam.

Wright Bagwell,

Formerly of EA, Visceral and Valve

What one game made you realise the importance of PCs as a platform for videogames?

Quake was the game that brought us all into the future, and showed how so many emerging technologies could come together on an open platform to do something revolutionary. I loved playing *Quake*, but I enjoyed making content for it on my PC and sharing it with the world even more.

Why do you think the 486 era is so popular with our readers?

Why is the 486 so well loved? I'm not really sure, because my first PC was actually a 486. My money is on *Doom* being the driver of its popularity.

What developers do you feel define the PC as a gaming system?

Today, Valve, Epic, Bethesda, Mojang, and Riot are the companies I most closely associate with the PC – they're companies that embrace user-generated content, and the idea that the content that players generate and share is the most valuable part of their business.

What is it that you personally love about PCs?

I love that PCs are an open platform for developers to build whatever they're interested in. It's where all the cutting-edge software and hardware shows up first, the hardware is the most powerful, and the communities are far more passionate than any other.

Michael Latham,

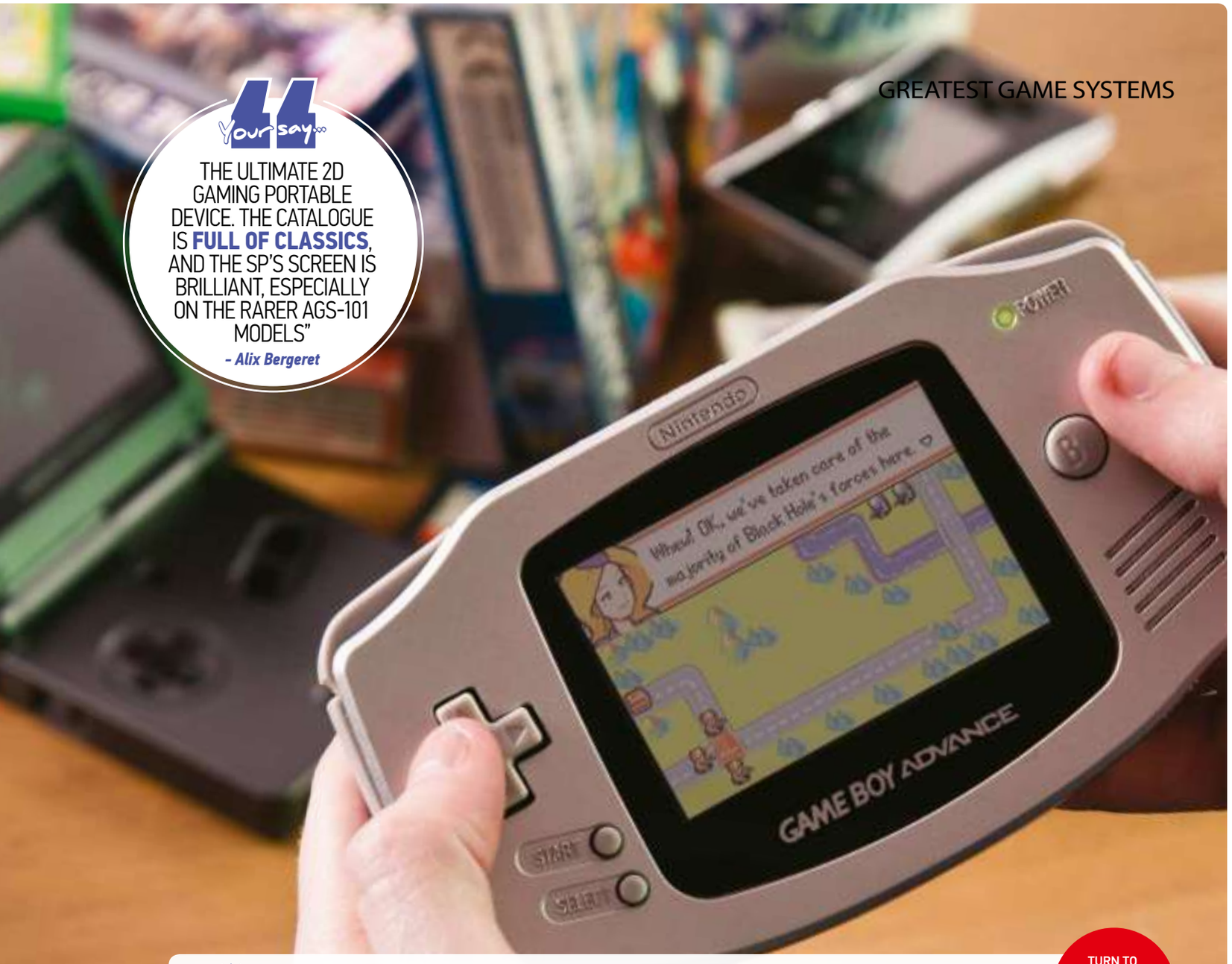
Formerly of Activision and Sega

Why has the PC been your most-played platform?

One of the key moments that made me want to make games was when I when into a computer store and saw a IBM PCjr, a horrible computer, playing *King's Quest* from Sierra. My mind was blown! I'd never seen details like that. There were small touches of animation going on all around the background, unlike any game I had seen. The story was movie level. I was seeing the proto-*Assassin's Creed* and *Uncharted*. My first PC was a Compaq Portable with a green monochrome screen, and I played a load of games on it that I loved. From there, it was upgrade after upgrade, PC gaming just got better. Now it's so good it threatens to push out consoles, which are being hit from the PC and mobile side. It's also the best solution for VR/AR gaming right now.

Fun fact

THE PC IS THE FIRST MACHINE SO FAR TO HAVE AN AVERAGE OF **OVER SIX POINTS PER VOTE** AND THE ONLY MACHINE OUTSIDE OF THE TOP TEN TO HAVE AN AVERAGE THAT IS SO HIGH



Your say

THE ULTIMATE 2D GAMING PORTABLE DEVICE. THE CATALOGUE IS **FULL OF CLASSICS**, AND THE SP'S SCREEN IS BRILLIANT, ESPECIALLY ON THE RARER AGS-101 MODELS"

- Alix Bergeret

14 GAME BOY ADVANCE

2D GAMING'S LAST HURRAH

TURN TO **PAGE 194** TO LEARN MORE ABOUT THE GAME BOY ADVANCE

MANUFACTURER: **NINTENDO** | YEAR: **2001**

■ **It's easy to forget that the Game Boy Advance was succeeded by the DS within four years, such is the number of great games released on the system.** The 32-bit handheld was an oasis of 2D gaming in an industry that had embraced 3D graphics, and hosted many retro conversions.

Steve Lycett, *Sumo Digital*

How much of an improvement did you feel the Game Boy Advance was over the Game Boy?

I always thought of the original as a portable monochrome NES, and at first glance, the GBA appeared to be a portable SNES. Early games suggested that, like *F-Zero*; but as developers got to grips with the system, it proved to be quite a step up. It was reasonably capable of 3D as *Doom*, *Crazy Taxi* and Stuntman proved, but it was 2D of course where the system shined, and with loads of sprites, smooth scrolling and transparency effects, it was starting to border on PlayStation quality!

Do you feel the SNES conversions overshadowed the original games?

It was a bit of a wonder to be able to play *Super Mario World* on the go for sure! However, this is a system that spawned *Advance Wars*, *Mario Superstar Saga*, plus the connectivity that gave you four-player *Mario Kart* and *Zelda Four Swords*, Nintendo was really pushing multiplayer in a way others weren't.

What game best sums up the system?

Tough question, it's home to many classics. Probably my favourite game was *Castlevania: Aria Of Sorrow*, as Konami was really firing on all cylinders. This was a game as good as the PlayStation *Symphony Of The Night* in all respects, especially on the audio front, running on a system that fit in your pocket and ran on two AA batteries!

Do you remember when you first got your GBA?

I actually secured mine from Nintendo before the UK release. Except... of course it didn't come with any games! So I had to buy imports of *F-Zero* and *Castlevania: Circle Of The Moon* which, not speaking a word of Japanese, made it quite interesting to play the games!

Which is your favourite GBA model and why?

I loved the feel of the original, but the GBA SP is where it is at. You could actually see the games! No more needing to get a chair near a window so sunlight could illuminate the screen. It's a shame about the headphone port (and yes, I did buy the adapter). Honourable mention must go to the GBA Micro, but my eyes were never quite up to it!

13 SATURN GAMING FROM ANOTHER WORLD

MANUFACTURER: **SEGA** | YEAR: **1994**

■ **Non-fans might remember the Saturn as a flop, albeit one with great conversions of *Virtua Fighter 2* and *Sega Rally*, but the console's diehard fans knew something the general public didn't – Japanese imports were where the real action was.** That international appeal accounts greatly for the Saturn's strong showing on your list.

Jon Burton,

Founder of Traveller's Tales

What were the strengths of the Sega Saturn?

In my mind, the strengths were that it had a lot of separate chips that you needed to work hard to get the best results. Anything that put off lazy developers left a nice advantage for us to exploit.

What is it you personally love about working on the system?

I loved thinking up ways to get the best out of the hardware. The chip diversity gave you lots of options on how to tackle a problem, and so you could create really novel solutions. For instance, you couldn't make transparent polygons (well, you could but the hardware corrupted them), but I figured out a completely different way of doing it so we had several stages of transparency to fade out polygons in the distance.

What was it like making the only new *Sonic* games for the system?

Both games had such tight deadlines that it was more of a time pressure than a, 'We're making *Sonic* games!' pressure. We knew we were helping Sega out of a bit of a *Sonic* hole left by *Sonic X-treme*, so we didn't really feel the pressure of making a *Sonic* game so much as getting it finished on time.

What's your best Saturn-related anecdote?

I always liked to impress Sega with a cool new effect each time they visited, so I worked really hard on making amazing reflective water for the first track in *Sonic R*. On his next visit I proudly let our producer Kats Sato play the newly polished level, and he didn't even notice it had changed... gutted!

Yu Suzuki,

Formerly of Sega, founder of YS Net

Why was the Saturn so great for 2D games?

I think that was due to the good balance the machine had for distributed processing. The setup did not put a burden on program processing, etc even if you did not pay attention to the graphics or sound.

What was it like to code for?

My design philosophy extended to all facets of the system so writing code for it was fun.

What is it that you love about the Saturn?

Using any one system did not adversely affect other systems through reduced functionality, so you could program without that worry.

What memories do you have of coding *Shenmue* on the Saturn?

Going into 3D functionality development, we did a variety of basic experimenting to push the limits of what we could do. It was thrilling, and my pulse was pounding the whole time through development.

What game do you feel defines the Saturn?

I think that would be the *Virtua Fighter* series. After the title launch of *Virtua Fighter,* the year after we came out with *VF2* which sold a record 1.7 million copies.

Why do you think that the Saturn remains so popular with our readers?

I think that was because the hardware itself sold well, and over 1,000 titles came out for it, giving players increased choice.

Fun fact

SEGA'S THE SECOND MOST POPULAR HARDWARE MANUFACTURER AMONG OUR READERS – ITS CONSOLES ACCOUNTED FOR 18% OF ALL VOTES CAST, BEHIND ONLY NINTENDO'S 33%

TURN TO **PAGE 168** TO LEARN MORE ABOUT SEGA'S 32-BIT CONSOLE

Your say...

THIS WAS MY FIRST NON-PORTABLE NINTENDO CONSOLE – I BOUGHT IT FOR ZELDA: THE WIND WAKER, AND LOVED FOR THE REST OF THE GAMES. LIKE THE DREAMCAST, **IT HAD A CATALOGUE OF GREAT GAMES** THAT WAS EASY TO COLLECT"

- smac

12 GAMECUBE NINTENDO'S PURPLE PATCH

MANUFACTURER: **NINTENDO** | YEAR: **2001**

■ **Nintendo struggled to fend off Sony and Microsoft in the market, but players had little reason to care.** With excellent new *Mario* and *Zelda* games, as well as *Metroid*'s first-person rebirth, new games like *Pikmin*, and third-party efforts like *Resident Evil 4*, there was no shortage of classic games to play.

Mike Keith,
Former programmer at Factor 5

What was the GameCube like to code for compared to its peers?

Nintendo knew from the outset that they had to provide a great developer experience if they were to have a chance at regaining market share. The GameCube was a very elegant, clean and powerful architecture with a good toolset. It's a shame Nintendo had to downclock the Flipper graphics chip at the last minute – prior to that *Rogue Leader* was running at a rock-solid 60fps.

How important do you think the GameCube was to developers like Factor 5/LucasArts?

It was hugely important for us at Factor 5. In addition to delivering a key launch title, we worked closely with Nintendo during the development of the machine, particularly on the audio side. Our MusyX system was the official audio middleware. LucasArts struggled with consoles, but *Rogue Squadron* for the N64 had been a real success and hopes were high for the sequel. Thankfully the GameCube got off to a good start and *Rogue Leader* along with it.

Do you have cherished memories from that time you want to share with our readers?

Perhaps my highlight was E3 2001, where we were one of the standouts of the show. The buzz was electric – I lost count of how many times I overheard someone say, "Oh my god, have you seen *Rogue Leader*!?" Meanwhile, the Xbox was somewhat underwhelming, with a certain FPS suffering from a poor framerate due to hardware issues. We left feeling pretty cocky about the situation... and, of course, we know how that turned out!

Why do you think the console is so collectible at the moment?

At the time grim, gritty games were all the rage, and the GameCube got branded as a 'toy' which – for some reason – was considered a bad thing. This meant a lot of gamers overlooked it, and in doing so they sadly missed out on a truly impressive library of fantastic games, which many people are only now discovering.

What makes the GameCube stand out amongst other machines in this list?

It was a console that combined technical prowess with a focus on gameplay, that didn't take itself too seriously and had a healthy sense of playfulness. It was a wonderful machine for developers and game fans alike.

11 GAME BOY PORTABLE PERFECTION

MANUFACTURER: **NINTENDO** | YEAR:**1989**

TURN TO **PAGE 126** TO LEARN MORE ABOUT NINTENDO'S HANDHELD

■ **Nintendo's greyscale great is your favourite handheld, and we'd imagine longevity was a key factor in more ways than one.** Not only was the machine a fixture throughout the Nineties, thanks to great games, but its modest hardware made it cheaper to run than the colour handhelds it competed with.

Jas Austin, *Former programmer at Martech and Bits Studios*

What was the Game Boy like to code for compared to 8-bit micros?

I found the transition fairly straightforward. I had previously coded on the ZX Spectrum and the Game Boy was also based on the Z80 processor. It did, of course, bring some unique new challenges, mostly with the Game Boy's hardware support. It was the first time I worked on a machine that had the luxury of hardware sprites and scrolling. Not to mention the daunting task of my first game being the iconic shooter *R-Type*.

Was there anything else you liked about it?

I feel its strengths lie mostly in its simple design, both for the player and us developers. While it did have hardware support for scrolling and sprites, it was pretty basic. This forced us coders to think outside of the box to get the most out of the machine. For example, even though I didn't end up writing the game, I put together a demo level for *R-Type II*. I chose the third level, with the two huge spaceships. They were way too large to display as sprites, so I utilised the hardware's vertical blank to create a floating raster line to enable me to have two separate scrolling areas on the screen.

Which game do you wish you had made and why?

Oh, that's an easy one – it would have to be the mighty *Tetris*. Such simple and elegant gameplay to produce the most addictive experience. The Game Boy was the perfect home for it, being able to get your quick fix while on the move, or even on the toilet.

Why was it such a popular system?

I would put this down to the fact that it was a truly portable games system. Around the same time there was also the Game Gear, and while it had superior graphics with its full-colour screen, this also caused it to have terrible battery life. Nintendo clearly saw the importance of playing time, even over graphical quality. Not forgetting it also had some fantastic games – *Zelda*, *Mario*, *Metroid*, *Pokémon* and *Tetris* to name but a few.

Richard Spitalny, *President of First Star Software*

So was it love at first sight?

My memory is that I first saw the Game Boy at CES. I loved it *immediately*! There really wasn't anything like it at the time, and it felt great. Finally, here was a handheld that let you switch cartridges so you could play different games!

Why do you think the system become so popular with non-gamers?

There were not lots of intimidating wires or controllers. Its controls extremely simple, and the games were bite-sized bits of entertainment that could be picked up and put down after a few minutes, or played for an hour or so.

Even though the Lynx was released at about the same time and had colour, the Game Boy crushed it. Not only were there better games for Game Boy, but I think that there were too many controls for 'most of us'. The Lynx seemed more targeted at 'gamers' versus the masses.

Why do you feel classic 8-bit games like *Boulder Dash* worked so well on the system?

Boulder Dash and most of the classic 8-bit games relied on innovation: clear and simple game mechanics, straightforward controls and well-designed levels and gameplay. The games were not reliant on superfluous graphics or stories. Thus, they didn't lose much when presented in that funky green, black and white. Finally, the fact that one only needed to move in four directions meant that the Game Boy's controls were perfect and supported the precision movements that were required.

What is it you love about the system?

You could carry it with you anywhere. *Tetris* and the other launch titles, like *Tennis*, were wonderfully engaging and easy to learn and play. The dot matrix screen presented graphics that were crisp and well defined. It's perfect for playing the simple types of games I really enjoy the most.

Fun fact

14% OF THE TOTAL VOTES WERE ATTRIBUTED TO HANDHELDS. FOR COMPARISON, HOME CONSOLES RECEIVED 68% OF THE VOTES AND HOME COMPUTERS HAD 16%

Super GAME BOY
Your say...
NOT INCLUDING A SECOND-HAND COMMODORE, THIS WAS MY FIRST GAMING SYSTEM BRAND NEW. IT DIED FROM OVERUSE AND HAD TO BE REPLACED SEVEN YEARS LATER!"
- RetroMartin
POWER
DOT MATRIX WITH STEREO SOUND
SCORE
755
LEVEL
0
LINES
9
BATTERY
Nintendo GAME BOY™
B
SELECT
START
NOV#2

Your say...

STILL CAN'T BELIEVE HOW MUCH **GAMING GOODNESS** CAN BE PACKED INTO A DEVICE SO SMALL WITH TECHNOLOGY FROM 35 YEARS AGO"

- the_hawk

10 ZX SPECTRUM BEST OF BRITISH

MANUFACTURER: **SINCLAIR RESEARCH** | YEAR: **1982**

■ **Sir Clive Sinclair's 8-bit marvel was a huge success in the UK and helped lead the gaming revolution that started off in bedrooms up and down the country.** Many talented developers, from David Perry and Matthew Smith to the Stamper brothers were linked to machine, while huge companies, like Codemasters and Rare, built their early businesses off the humble 8-bit micro. Little wonder, then, that it's placed so highly in this list.

Steve Crow, *Former ZX Spectrum programmer*

How important was the Spectrum to your career?
The ZX Spectrum was absolutely fundamental in launching my career. My first professional game, *Laser Snaker*, was published for the Spectrum. After that, as I continued to progress as a game creator, the Spectrum was the ideal platform to create large expansive games and was always the machine I developed my games on.

What was the Spectrum like to code for compared to its peers?
Compared with C64/Atari 800 the Spectrum had virtually no built-in graphics or audio hardware, such as sprites, audio chip or any form of hardware screen scrolling. However, it had one advantage: a faster processor with some pseudo-16-bit operations. This made it like a blank sheet to work with, as everything had to be done in software. It was up to you, the programmer, to write the fastest sprite routine or create great sound and music from a speaker that could only be moved in or out! This made it a great challenge to work on and also very rewarding at the same time.

What is it you personally love about the Spectrum?
It is such an iconic design – it doesn't look like any other personal computer – with its rubber keys, rainbow stripe and all the basic words accessible from key combinations truly a unique and efficient design.

Why do you think the Spectrum has such a vibrant following after all these years?
It was the right PC at the right time. It was affordable to the average family, had fantastic games available and gave so many of us such wonderful memories of our childhood. Saving up your pocket money and then the excitement of loading up and playing the latest game to come out! I think it is that feeling of reliving those times and all the memories associated with them that keeps the ZX Spectrum so popular today.

TURN TO **PAGE 58** TO LEARN MORE ABOUT THE 8-BIT HOME COMPUTER

9 NES THE EVERGREEN FAVOURITE

MANUFACTURER: **NINTENDO** | YEAR: **1983**

TURN TO **PAGE 82** TO LEARN MORE ABOUT HOW THE NES WAS CREATED

■ **Even though it fared poorly in Europe that hasn't stopped Nintendo's console from powering its way into your top ten.** We'd argue that its inclusion is down to the enduring nature of its excellent library of games, the fact those games are accessible on so many modern systems and that the console laid the foundation for some of Nintendo's biggest franchises, some of which are still going strong today. Hey, maybe it's not such a surprise after all.

Chris Crawford,
Videogame designer

Can you recall your very first encounter with the NES for us?

My earliest memory of the NES was playing *Super Mario Bros.* on the family TV right after my dad set everything up. I'd seen it in advertisements, but not up close – and, wow, it didn't disappoint. It had taken some time convincing my parents that our family's Atari had become a relic, and that the NES was the wisest investment they could possibly make. Thankfully, they finally listened to reason.

The NES quickly established its place in my and my friends' minds as the replacement system for all those aging Atari 2600s most of us still had. By the time I was negotiating for a NES in 1986, the Sega Master System had launched in the US, but it was too late – all the kids in my peer group had already declared for the NES. It wasn't just timing, though. Nintendo was also producing much better original titles than what Atari and Sega could muster (it's tough to compete with Shigeru Miyamoto), and top-tier developers like Konami and Capcom were making their own classics for the system.

Sounds like you took to it instantly! Was there anything else that made you fall in love with it?

The graphics were a big leap, but what really sold me on the NES was the gameplay. The games felt so responsive, and their worlds were massive. There were some exciting peripherals, too. Lightgun games were unheard of outside of arcades, and while R.O.B. the robot might not have been very practical (or even very fun), he seemed impossibly advanced back then. Even the controllers felt high-tech – we'd never seen anything like them. The NES inspired me to design videogames of my own for the first time, which eventually steered me to my current profession. I used to sketch out levels and characters for my own *Zelda*-esque adventure games, and my brother Kyle and I would incorporate ideas and characters from NES games into our own imaginary worlds. It was a really inspiring and fun time.

Your say

"THE SYSTEM THAT I GREW UP WITH AND **MADE ME FALL IN LOVE WITH GAMING.** SO MANY GREAT FRANCHISES STARTED HERE"

- Nathan Riggins

8 COMMODORE 64
BREADBIN BELOVED

TURN TO **PAGE 74** TO LEARN MORE ABOUT HOW THE C64 WAS CREATED

MANUFACTURER: **COMMODORE** | YEAR: **1982**

■ **Driven by Jack Tramiel's philosophy of making computers "for the masses, not the classes", the Commodore 64 packed powerful graphical capabilities and a legendary sound chip into an affordable package.** As a result, coders embraced the platform and created incredible games that make this **Retro Gamer** readers' favourite 8-bit machine.

Rob Hubbard, *Former videogame music composer*

Where did it all begin for you and the C64?
I bought a C64 based on the fact that it had 64KB RAM and a three-voice sound chip. The other machines at the time just didn't seem as interesting. Straight away I found the machine fascinating because it was so interesting and difficult to get anything to work – like the listings in the magazines.

Why was the machine so good for composing music?
Because it had a synth chip, which was somewhat familiar to those of us who had dabbled with analogue synths.

How much of your career do you owe to the C64?
Difficult to answer, but looking back I'd say a huge amount. I didn't expect the games business to take off like it did and become so huge. The C64 work led to my career move to EA. That being said, though, I think I would have still done something quite interesting in music if the C64 had not happened.

You've composed a lot iconic soundtracks for the machine, but which other C64 tune do you wish you had composed?
Well, to be honest I never had much time to check out other games or music in the Eighties, when I was working flat-out and silly hours getting everything done. And then when I moved to EA, I was very conscious of accidentally ripping off some other music, so I made a point of not listening to other music, except for more some contemporary classical and orchestral pieces. I didn't want to cause EA a lawsuit! It's so easy to accidentally pick up a motif and use it unintentionally. Having said that, I always did like Martin Galway's *Rambo*, and also *Wizball*. Both very good. I wish I had written that *Rambo* tune!

Why do you think the machine remains so popular today?
Mainly nostalgia, and looking back to childhood or teenage years, and maybe a rejection of the bloated machines of today. And, maybe because it's relatively simple to program and there's no convoluted operating system or C++ to get in the way.

Your say...

"THE FIRST COMPUTER I COULD CALL MY OWN. I GOT MINE IN 1987 WHEN I WAS TEN, AND I STILL SWEAR TO THIS DAY THAT **THIS MACHINE GOT ME IN TO COMPUTING**, AND HAS RESULTED IN ME DEVOTING MY LIFE TO USING AND WORKING WITH COMPUTERS"

- Stuart Wilson

7 NINTENDO 64 NINTENDO'S N GAME

MANUFACTURER: **NINTENDO** | YEAR: **1996**

TURN TO **PAGE 184** TO LEARN MORE ABOUT NINTENDO'S CONSOLE

■ **The Nintendo 64 marked the beginning of the end of Nintendo as the dominant player in gaming, but it nevertheless leaves behind a legacy of truly exceptional games.** The influence of *Super Mario 64*, *Ocarina Of Time* and *GoldenEye* can still be felt in games today while its bespoke controller also set a trend that would be repeated in its later systems.

Mark R Jones,
Former 8-bit graphic artist and N64 collector

You're a big collector of the system, what do you like about it?

The big thing for me was that I felt games had actually entered the next phase with the introduction of proper 3D. With the SNES we were still really getting souped-up versions of games I'd played on the Spectrum, just with better graphics, smoother scrolling and more memory. With the N64 and the 3D it was capable of that next phase had finally been reached. The instant loading afforded to us by the games being stored on cartridge was also a welcome luxury. I was also quite ill for a period I owned my N64 and was holed up in my house, not being able to go out much, so having a machine kept me as sane as I could under the circumstances and my day would consist of the copious cups of coffee, 20 Marlboro Lights (I did give up the evil tobacco eventually) and my N64. I worked through most of *Donkey Kong 64* during this period, though I still have never managed to finish it.

What legacy will the N64 leave behind?

It has a comparatively small library of titles compared to other consoles but that collection contains some of the best games ever produced. I do see the machine getting slagged off quite a bit due to its blurry graphics and some titles short draw distances but none of that bothered me, back then or now. Admittedly, some graphics [on certain games] look a bit dated but there's a core of games there that can still amaze and are still a joy to play even 20 years later.

Ah, so it was the games. So how impactful do you think games like *Super Mario 64* and *Ocarina Of Time* are to the industry?

Hugely. They showed everyone what was needed to make a perfect game and what was possible. Both those games are still amazing to load up and play and still will be in a hundred years' time. Nintendo got it so right. Not only did everything look jaw-droppingly gorgeous, they got the playability, difficulty levels, sound and music spot on. At the time of their release there really was nothing like them. Nothing came close. We were witnessing the second coming and I was getting the same amount of wonderment I'd experienced over ten years ago when I was witnessing all the firsts of 8-bit gaming with my ZX Spectrum!

Fun fact

MORE THAN **40% OF READERS VOTED FOR THE N64**

6 AMIGA 500
THE 16-BIT POWERHOUSE

MANUFACTURER: **COMMODORE** | YEAR: **1987**

■ **The Amiga 500 felt like a quantum leap for videogames when it was first launched in 1987, and we can imagine that seeing demos of *Batman* or *Shadow Of The Beast* convinced many 8-bit owners that they finally needed to upgrade to Commodore's supercharged system.** It's high placing in your list suggests that your jaws were dropping just like ours when you first encountered it.

Martyn Brown, *Cofounder of Team17*

The Amiga is the highest-voted computer in our list, why do you think that is?

It doesn't surprise me, there's just something about the Amiga that bonded so many people and brought so much entertainment. It's probably responsible for a massive interest surge in both gaming and a gaming career.

How important has the Amiga been to your career?

The Amiga was hugely important for me in terms of a career. The timing, my age and associations, as well as the flavour of the machine, made it pretty much perfect in all walks of my life at the time. It was great to be associated with the machine and a number of pretty good games at the time. Without the Amiga and great friends around me at the time, I'm not sure I'd have really made it – it was a real catalyst.

You must have a fun story from when you were working on Amiga games, surely.

I have a lot because we used to work hard and play harder. But my favourite one that perhaps can be printed was a briefing down at Commodore where everyone in the meeting went quiet when the tea lady came in, then as she left, we were shown the prototype CD32 controller. Well, it amused me that they didn't want her to see it, I'm not sure what damage it would have done.

Why do you think Team17 games became synonymous with the Amiga?

I think it's because we went over and above for the machine, we shot for one-meg-only games and made crafted titles that used the best of the machine. There were a lot of ports at the time and we always tried to make colourful, smooth scrolling and great sounding game experiences. Given our independence, we were able to make the games we wanted to play.

What is it *you* love about the Amiga?

I loved the Amiga because of its open architecture and the fact that you could achieve great things, with great sound and visuals. I loved the spirit of community that the Amiga brought and the passion, I'm not sure there's ever been a computer like it before or since.

Andrew Braybrook, *Former Commodore 64 and Amiga coder*

How was the Amiga to work with?

There was a big time difference between when I first saw an Amiga and when I was allowed to start writing code professionally, something like four years, which is a long time to watch the greener grass on the other side of the fence. When I did get to write for the Amiga, there were a lot of new toys to get to grips with: the blitter, the copper, more colour choices, more memory, four-channel sampled sounds and a great CPU. I was then a tad disappointed that the machine was slightly underpowered to just use as-is, so we had to find ingenious ways to make best use of the hardware. Finally, the Amiga flowered into the A1200 AGA machine. And all too briefly after, she was taken from us. She was though by far the best at the time.

Allister Brimble, *Amiga composer*

Why have you chosen the Amiga as your favourite system?

I love the Amiga because it was a huge step in both graphics and sound, which brought us into the 16-bit era, and allowed a new generation of audio, graphic a and coding artists to explore their creative potential.

Stuart Atkinson, *Former Amiga artist*

Why do you love the Amiga?

I suppose the main reason I loved the Amiga back then was for its graphics capabilities. DPaint was bundled with it and I couldn't stop using it, it's a brilliant art package on an amazingly fast machine. That's what was so good about the machine – it was all about creating your own stuff, art, music, animation, programming and not just for playing games.

The demo scene was a major part of owning an Amiga for a lot of people, too, They were such a vibrant creative bunch, it's what lead to me and several of my friends to getting jobs in the industry. And I got to develop a couple of games professionally on the machine I loved so much, which was awesome!

TURN TO **PAGE 100** TO LEARN MORE ABOUT THE AMIGA 500'S RISE TO POWER

Your say

A MAGNIFICENT ALL-ROUND GAMING MACHINE AND A VERY NOTICEABLE UPGRADE ON THE 8-BIT SYSTEMS"

- PostieDoc

Fun fact

80% OF VOTERS THAT PICKED A 16-BIT HOME COMPUTER CHOSE ONLY THE AMIGA, WITH 12% PREFERRING THE ATARI ST AND 8% NEITHER

5 PLAYSTATION 2
THE TITANIC TOWER

MANUFACTURER: **SONY** | YEAR: **2000**

■ **As the bestselling games console ever made, with over 155 million sold, the appearance of the PlayStation 2 in this list was inevitable.** Massive hype gave way to a slow launch, but eventually games arrived to satisfy every taste you could imagine, ensuring that Sony retained the market dominance it had established in the Nineties.

Andreas Axelsson,
Former Digital Illusions and PS2 programmer

You've described the PS2 as having "mad architecture" – what do you mean by that?
While the PlayStation 2's Emotion Engine was very capable it was also very hard to harness its power, and in a way I think that's what gave the console such longevity. It just took a very long time for developers to figure out how to best utilise it, and when they did they could keep up with the evolution of other platforms for longer than was otherwise normal. It gave highly complex parallel processing to programmers who were used to a single CPU, with possibly a GPU on the side.

What was the machine like to work on?
Just as with the original PlayStation, the development tools were very basic, while the development kits were expensive and complex to set up. Many of the tools felt half-finished, and with documentation translated from Japanese, it was sometimes a challenge to figure out how things worked. I'd say I had something of a love-hate relationship with it.

So what's your best memory from when you were working with the PS2?
I think my best memory from the PlayStation 2 was *ICO*. It was such a radical step away from most games and beautifully executed. And I grew up with Disney all around so *Kingdom Hearts* was one of my favourite games.

Why do you think it's currently the bestselling console of all time?
I think the complexity of the PS2 also made it more interesting than other machines, both to players and to developers. That developers could evolve and learn over such a long time, and learn how to squeeze even more performance out of it, helped ensure it was worth making games for it for a very long time.

Despite your love-hate relationship professionally how did you feel about the PS2 as an entertainment system?
With the PlayStation 2, Sony took what they started with the PlayStation and made a real powerful machine. The controller was great on the PlayStation and the PlayStation 2 made it better. There were so many great games, which is the biggest reason for any console selling well in my opinion. And as I mentioned, the challenges of developing on it were appealing to the programmers that were around.

Fun fact

THE PS2 JUST MISSED JOINING THE FOUR CONSOLES ABOVE IT IN THE ELITE CLUB OF MACHINES THAT APPEARED ON OVER HALF OF ALL BALLOTS, **WITH 49.9% OF YOU PICKING IT IN YOUR TOP TEN**

TURN TO **PAGE 192** FOR MORE INFORMATION ON SONY'S CONSOLE

4 DREAMCAST
BURN BRIEFLY, BURN BRIGHTLY

TURN TO **PAGE 188** TO LEARN MORE ABOUT SEGA'S FINAL HOME CONSOLE

MANUFACTURER: **SEGA** | YEAR: **1998**

■ **Few consoles inspire the passion that Dreamcast fans hold for their machine.** There are many reasons it's an all-time great – an astonishing run of great games in a short time, the arcade focus that would never be seen again, a vibrant homebrew community, and, of course, its status as Sega's hardware swan song.

Ed Logg, *Former game designer at Atari and Atari Games*

You saw the Dreamcast early on, behind closed doors, what was that like?

My first encounter with the Dreamcast is when I was called to Sega Of America's headquarters to have a meeting with all the parts manufacturers and major developers for the announcement. After they gave their talk, which included a launch date, I asked a few about when we could get development systems, etc. It became immediately clear there was no way they could make their deadline so I got up and left. The manager came out and asked me why, so I told him. Sure enough it was released much later.

What was it about the Dreamcast that made you enjoy working on it?

I liked working on the Dreamcast because the video looked so much better than the Nintendo 64, and it did not suffer from an issue with the polygon edges tearing that the Nintendo 64 had.

What's your best Dreamcast-related anecdote?

I added some security to our code to keep hackers from breaking the security and making free pirated copies of *San Francisco Rush 2049*. So when players placed high scores or uploaded any data, it would include a flag that said this was a hacked version. We never used this data, and I have never seen it mentioned in any literature. One hacker once told me that this game was the hardest to crack, but I just did not have the heart to tell him I could easily detect the hack and that Sega had this information.

Your say...

"THREE WORDS: **PHANTASY STAR ONLINE**. OH MY FRIGGIN' GOD, THE ULTIMATE KILLER APP, THE NUMBER ONE SYSTEM SELLER. I PUT AN UNGODLY AMOUNT OF TIME INTO THIS, UNFATHOMABLE RAGE AND BOTTOMLESS DELIGHT"

- smac

Fun fact

BETWEEN THE PLAYSTATION AND N64, 45% OF VOTERS CHOSE ONLY SONY'S SYSTEM, 23% CHOSE JUST NINTENDO AND THE REST PICKED BOTH

3 PLAYSTATION
NEVER UNDERESTIMATE THE POWER

MANUFACTURER: **SONY** | YEAR: **1994**

■ **Sony's first entry into the console market was a game-changer in every sense possible.** Its 3D power was incredible, blowing away the competition, and developers used it to create longer, more cinematic games. The PlayStation also took gaming into the mainstream, becoming the first ever console to sell over 100 million units.

Mike Dailly, *Former programmer of DMA Design and Realtime Worlds*

Why do you think the PlayStation was such a success?

The PlayStation was a massive step for a home console, the jump from 2D to not just flat 3D – which was still what people were mostly used to at the time – but fast, fully textured 3D. This was phenomenal, jaw-dropping, in fact. *Ridge Racer* – the first game I saw and bought – was a literal clone of the arcade machine, which is astounding for its time.

How did the PlayStation compare to other systems at the time from a developer viewpoint?

The 3D nature made it a fair jump in development processes from PCs and 2D games. Not only did everything take much longer, but it was a lot more complicated to do as well. Performance-wise, the CPU wasn't hugely powerful, and it had a small cache so to get the best out of it, you did still have to drop down to MIPS to get the best from the machine. For a tech head, it was great fun, full of tinkering and cool new tech.

How important were games like *Grand Theft Auto* to the success of the system?

Grand Theft Auto itself did pretty well on the machine, but other games did even better. It was, however, the first step in truly moving gaming from the bedroom to the living room. 16-bit consoles were still pretty geeky, but the PlayStation elevated the perception of gaming. Games like *WipEout* made it 'cool' and that was a big step into acceptance by the world at large.

How do you think the PlayStation will be remembered by gamers?

The PlayStation had some great games, and helped birth some amazing series. *WipEout*, *Grand Theft Auto*, *Metal Gear Solid*, *Tomb Raider* and *Ridge Racer* all appeared on the machine, and while they didn't all start life on there it got the masses interested in them, and this helped bring them into the hearts of gamers.

Paul Hughes, *Former programmer at Warthog Games and Traveller's Tales*

What was your initial reaction to the PlayStation when you first saw it?

It's going to sound a bit cliched but the first thing I saw was the now infamous dinosaur demo. You were looking at the dev boards and thinking, 'This little box can produce this? Holy shit!' Everything about the PlayStation experience dragged you in, right from the initial boot sequence with its swooping, echoing sounds. It just screamed, 'Welcome to the future.'

Why do you think Sony was able to immediately disrupt the established companies in the console market?

First and foremost they had great hardware. For the time, it was leaps and bounds ahead of the competition. Second, the Sony brand: they may not have had the 'oomph' of Nintendo or Sega in the game space, but Sony was a *huge* electronics brand with a cult following. If you took that and some very impressive launch titles it was hard for them to fail.

Which games do you feel defined the platform?

It's kind of an eclectic mix; *WipEout* was the first 'killer app', although I'd argue that *WipEout 2097* was a better game. I loved *Tekken* and still do – I was actually really impressed at how quickly they could pull in so much animation data between rounds. The *Spyro* series really showed off what lovely visuals could be achieved. Finally I thought Neversoft's original *Spider-Man* was an absolute tour de force, seamlessly combining story telling with the third-person action adventure genre.

What do you feel is the PlayStation's lasting effect on gaming?

For me, it was the first piece of consumer electronics in the games space that forced its way into the living room setup, alongside your TV/VHS/ Hi-Fi. Its elegant design 'fit in' – something only Sony of that era could have pulled off.

TURN TO **PAGE 170** TO READ ABOUT THE IMPACT OF SONY'S CONSOLE

Your say

THE PLAYSTATION WAS THE **START OF NEW EXPERIENCES** IN HOME GAMING, AND WHILE THE 3D IS UGLY BY TODAY'S STANDARDS, THE GAMES ARE STILL EXCELLENT"

- Graham Plowman

2 MEGA DRIVE TO BE THIS GOOD TAKES SEGA

MANUFACTURER: **SEGA** | YEAR: **1988**

■ **For all its achievements, the Mega Drive will perhaps be best remembered for being the first console to finally break Nintendo's ironclad grip of the market (even if it was for the briefest of moments).** It might have trailed behind the PC Engine in Japan, but things were very different for Sega's console in the West, thanks to strong developer support from the likes of Electronic Arts, a string of killer arcade conversions and a little blue hedgehog by the name of *Sonic*.

Trip Hawkins,

Founder of Electronic Arts

Why was the Mega Drive so important to EA's early success?

Way back at Apple in 1978, Steve Jobs and I agreed on the need for a 16-bit processor and targeted the Motorola MC68000, which was in some ways the spiritual successor to the 6502. While the 6502 dominated through the Eighties, we put the 68000 in the Lisa and Mac. My biggest love affair was with the Amiga, but Commodore mismanaged the business and it did not help that it cost over $1,000. Of course, I also cared about graphics and sound chips and had seen what great things Rob Hubbard and others had done with the SID chip in the C64. The Amiga was so great that we were able to licence the coin-op code base for *Marble Madness* and do a simple translation to port it to the Amiga and have it look and play the same. In 1988 I heard that Sega would be bringing a console to market at a price under $200 that would have a 68000 and good custom graphics and sound chips. I led EA to make a bet on it and we helped it take off. The rest was history. You could say it was an overnight success that took more than a decade.

I'd known for all those years that to make the games I really wanted to make and to play, we would need a 16-bit system with custom graphics and sound chips. For there to be a meaningful market a lot of them would have to be sold, which made pricing critical. The Genesis/Mega Drive was the first machine to have all that. Other choices at the time were either inferior 8-bit systems or too expensive. Also, the Mega Drive was perfect for EA Sports, where it is ideal to play with a friend in the same room and to have enough graphics speed for team sports. It even came with two joysticks!

David Perry,

Cofounder of Shiny Entertainment

Can you recall your first encounter with the Mega Drive?

Nick Bruty and I were a two-man team making games for ZX Spectrum, Amiga and Atari ST. The main flow of games we created was for Probe Software (run by Fergus McGovern), games like *Teenage Mutant Hero Turtles*, *Dan Dare III* and *Paperboy II* etc. Fergus managed to get us a Mega Drive and the licence to the movie *The Terminator* by James Cameron. Most exciting day ever!

Of course, we accepted the project, but we had no experience on this device, I had no idea how to program it and the manual was mostly Japanese. We also had no tools to make games for it. Back in those days, we felt invincible, so we just started typing!

What was it like to work with compared to home computers?

Programming on consoles was the best because they were a walled-garden, not constantly changing. Same with the controllers, only a few buttons and so the environment was as pure as it could be. Interestingly, I never personally made a PC game through my entire career. I did learn how to program 8086 assembly language, but never got around to making a PC game.

How important was the Mega Drive to the success of Shiny Entertainment?

Shiny was funded by Playmates Toys, they made the toys for *Teenage Mutant Hero Turtles* and wanted to invest into games. The Mega Drive was the perfect platform as it allowed us to make games for their target audience. The result was not only getting to make *Earthworm Jim* on Mega Drive, but we also got a line of toys, a TV show, Marvel comic books, even licensed Halloween masks and underpants!

Why was Sega able to briefly top Nintendo with the Mega Drive?

Nintendo has always focused on the younger gamers and so when *Mortal Kombat* had blood and violence, they created a red line. While that made sense, all I saw was gamers wanting to sell their 'Nintendos' and buy 'Segas', let's just say they didn't welcome censorship.

Why do you think the Mega Drive remains so popular with our readers?

Mega Drive was the source of *countless* hours of entertainment for people. Wherever I go, people that grew up with it remember our games like *Earthworm Jim* and *Disney's Aladdin* and gush about how much they loved Mega Drive gaming as a kid. This was before iPhones, iPads and Netflix, it was the centre of many people's entertainment universe.

TURN TO **PAGE 116** TO LEARN MORE ABOUT SEGA'S MEGA DRIVE

Your say
I SPENT LOADS OF TIME IN THE ARCADES GROWING UP IN GREAT YARMOUTH AND FOR ME THIS WAS THE FIRST CONSOLE, WHICH **REALLY FELT LIKE ARCADE-QUALITY GAMING** AT HOME"
- JamesC
Fun fact
THE MEGA DRIVE APPEARED IN **OVER 70%** OF READERS' VOTES
16-BIT
POWER
ON
OFF
MEGA DRIVE
SEGA

Fun fact

IN THE 16-BIT CONSOLE BATTLE, **59% OF YOU REFUSED TO PICK A SIDE** AND CHOSE BOTH THE MEGA DRIVE AND SNES. 20% CHOSE SEGA'S MACHINE ALONE AND 21% CHOSE JUST THE SNES

Your say

THE PINNACLE OF AFFORDABLE 2D GAMING AT HOME, WITH MANY TIMELESS CLASSICS... STREET FIGHTER II IN YOUR LOUNGE ANYONE?"

– Alix Bergeret

1 SNES YOUR FAVOURITE MACHINE

MANUFACTURER: **NINTENDO** | YEAR: **1990**

■ **Here it is: the system that Retro Gamer readers have voted the greatest of all time.** As soon as voting began it was clear that one of the great rivals of the 16-bit era would win, and the leader changed frequently. In the end, the SNES finally triumphed over Sega's Mega Drive by a whisker.

In hardware terms, the SNES proved to be a contemporary powerhouse. It could display more colours than the competition and offered special effects, like transparency. Its custom hardware also allowed for a graphical layer featuring scaling and rotation, the famous Mode 7 technique – possibly the most famous custom hardware inclusion of all time. Its sound hardware played back actual samples, leading to richer audio in games like *ActRaiser* where symphonic sounds could be achieved. Its CPU wasn't the strongest, but this was a drawback that its developers overcame. The control pad was a revelation, too – even now most game controllers offer the same diamond formation of four face buttons, as well as shoulder buttons.

While many systems have suffered from slow launches or late declines, there was never a bad time to be a SNES owner. When **Retro Gamer** readers voted for the greatest games of all time back in issue 150, they put *Super Mario World* right at the top, and that was available as soon as the Super Famicom launched in Japan. The fierce competition in the console market drove the development of many classics in the early Nineties, from first-party originals like *Super Mario Kart* and *Super Metroid* to third-party hits like *Street Fighter II* and *Secret Of Mana*. Even when the rest of the world was looking towards the PlayStation and Saturn, SNES owners were enjoying games like *Yoshi's Island*, *Earthbound*, *Kirby Super Star*, *Terranigma* and *Street Fighter Alpha 2*. From massive hits like *Donkey Kong Country* to offbeat cult classics like *Unirally*, the SNES always had great games across all genres.

But perhaps more than anything else, the SNES is readers' favourite console because it was the last console to arrive before gaming started to change. The SNES came at a time when competition in the market was between gaming companies, rather than enormous tech giants. It came at a time when arcades ruled the gaming world and 3D was a novelty. No FMV intros, no DLC, just great games for years. Long live the SNES.

Chris Sutherland,
Ex Rare programmer

What first impression did the SNES leave on you?

My first encounter of the SNES, as a player, was watching and playing *Super Mario World* after a Super Famicom appeared in the Rare office in 1991. Although *Mario World*'s visuals are clean and bright it was still clearly a step up from the NES, and as I ran, jumped and flew Mario through various levels and castles I remember thinking that at last we'd be able to play games with visuals comparable to what was in the arcades!

My first software engineering encounter with the SNES was a little later; it was in August 1993 when I moved from *Battletoads Arcade* onto a new top-secret project in a building that was locked off from the rest of the company. Prior to that, others had been working on the console at Rare, and so I had some rough knowledge of some of the specs, but it is always exciting to start working on a new piece of hardware!

So, specifically, what is it about the SNES that you like?

I love the way these older generation consoles, like the SNES, were built as dedicated games machines – they allow you quite easily to have a good number of things whizzing around the screen, and at a lower cost than had you tried to build a 'general purpose' system like a PC.

The trade-off for that power is that you have some limits on the number of things that can be whizzing around, or the ▶

Your say
ARGUABLY NINTENDO'S GREATEST ACHIEVEMENT, AND YET THE HARDWARE ITSELF WAS LACKING IN ONE OR TWO AREAS. BUT THE PRINCIPLE MANTRA IS THAT A PLATFORM IS ONLY AS GOOD AS THE GAMES RELEASED FOR IT, AND THAT'S WHERE THE SUPER NINTENDO COMES THROUGH IN SPADES"
- Mayhem
Fun fact
70.5% OF READERS INCLUDED THE SNES IN THEIR TOP TEN LISTS, AND IT RECEIVED AN AVERAGE OF 6.9 POINTS PER VOTE – BOTH HIGHER THAN ANY OTHER SYSTEM
SUPER NINTENDO
SELECT
START

TURN TO PAGE 136 TO DISCOVER MORE ABOUT NINTENDO'S CONSOLE

number of colours they can be in or even the complexity of the visuals. But like with all things, once you dig deep enough there are ways you can work around some of those limits.

What was it like to code for, compared to other systems?
It was (as the name suggests), a much boosted version of the earlier NES – Nintendo had refined and honed the technology used in their earlier system based (I'd assume) on how they had seen it being used over a number of years. It had more video RAM, more colours, more sprites than its predecessor (and even more buttons on the redesigned controllers). It also had more 'graphic modes' of operation. These were different settings that allowed you to trade off one feature, such as number of colours, against another, such as the number of independently scrollable layers, the most well known of which was Mode 7, which allowed the screen to rotate or give an illusion of depth.

As a result, we benefitted from the familiarity of working on systems, such as the NES or Game Boy, and a lot of the tricks we used there could be brought directly across to this new machine. Compare this with when we moved to N64 which required a lot of new learning and development methods.

What game, for you, best defines the SNES?
It's often the earlier games that define a console, and for me it would be either *Super Mario World* or *The Legend of Zelda: A Link To The Past*; I'd choose *Super Mario World,* as it was there right at the start and was just packed with colourful and fun elements.

What was it like rebooting *Donkey Kong* for the system?
At the time I don't think we all fully appreciated the scale of the task in being handed one of Nintendo's key characters to develop with, which is probably just as well as if we had we'd have been too terrified to do anything! We had two advantages: first that we had people with a lot of experience working on Nintendo systems, and second that we'd done some sample tests to prove out the idea of getting rendered images onto the SNES. When we started we weren't entirely sure of making an entire game like this was even possible, but the goal was promising enough from the sample tests that it seemed worth trying anything to make it work. We knew these prerendered images, even when crunched down, would eat up the available video RAM of the system, but fortunately our experience with Nintendo systems meant we could use a lot of tricks we'd built up over the years to work around that.

What's your clearest memory from the SNES days?
Paying about £90 for an import copy of *Street Fighter* – that's the kind of thing you don't forget! Apart from that, it would have to be the reaction from people when we announced *Donkey Kong Country*. Nintendo's next console was rumoured to be around the corner and people thought that the visuals must have been from that, but in fact they were all generated by the humble little SNES!

John Romero,
Cofounder of id Software, Ion Storm and more

Why do you think the SNES has topped our reader poll?
The SNES was the perfect console of its time, eclipsing the previous gen. Developers enthusiastically made hundreds of games for the SNES just like they did on the NES, but this time there were more colours, more speed and more interesting graphic modes – like Mode 7 employed by the classic *F-Zero*.

The killer apps of the SNES were undoubtedly what made the console legendary: *Super Mario World, A Link To The Past, Final Fantasy VI, Chrono Trigger, Earthbound, F-Zero, Super Metroid* – the list is long. This was my favourite console of the past 40 years. I've never had so much fun on any other console.

Mike Dailly,
Former programmer at DMA Design and Realtime Worlds

Tell us a little about the first time you laid eyes on a SNES.
The first time I saw one was at work [DMA Designs] when we got one in with *Super Mario World*, at which point I got totally hooked. It was clear it was a big step up from the older platforms, even from others like the PC Engine. I played *Mario* for a year solid, getting 100 per cent and all the hidden areas it had to offer.

When did you start developing for the SNES?
After I'd finished *Shadow Of The Beast* on the PC Engine I moved onto the SNES for writing *Lemmings 2*. There were some really cool toys in the SNES that meant I could pull off some nice tricks. I utterly loved the three levels of parallax I could get with the machine, which is why the SNES is the only one to have the (very cool) dual-playfield gameplay, making it *much* nicer looking. I had great fun with *Lemmings*, from adding snow in the polar levels, to allowing the Super Scope to be plugged into port two so you could shoot the lemmings and blow them up.

You also worked on *Uniracers*, which we really like.
Uniracers was a much more natural SNES game, but we still found some really nice tricks. It's a two-player split-screen game and we wanted as thin a split as possible. Using an old C64 trick, however, I got the guys to 'rip' the sprites and this gave us a 'perfect' raster split with no gap between the play areas. Nintendo had never heard of this trick and insisted Nintendo R&D test it on every hardware revision of the machine to make sure it worked. It did, so we were allowed to keep it in which was a relief! We also started a *Kid Kirby* game for Nintendo, but it got canned.

You've coded for a huge range of machines over the years – is the SNES one of your favourites?
I loved the SNES. It had enough toys to allow some really neat effects and allowed you to push the boat out compared to other platforms. In fact, I loved it so much, I wrote my own assembler on the Amiga and download tool to the 'hacker' device, the Magicom, so I could develop at home.

Julian Eggebrecht,
Cofounder of Factor 5 and TouchFactor

What did the SNES represent to you, as a game developer?
The SNES was a revelation in colour and possibilities for me. I always loved the Amiga for its 4,096-colour palette and the ability to display even pastels, so the SNES with 32,000 colours was the next step upwards while the Mega Drive and PC Engine felt like taking somewhat of a step back in that area. Mode 7, of course, was the other big revelation, with so many possibilities for 2D games as well as the 3D games of that generation. The SNES simply upped the ante on so many levels: it facilitated whole new genres with the technology palette it provided.

Simon Butler,
Artist at Ocean, Team17 and more

What does the SNES mean to you?
The SNES for me was the finest gaming console ever. Consoles have come and gone, but the SNES is easily number one. Its titles covered all genres. Every game I played has influenced my approach to development, but SNES titles figure larger than most. They had an accessibility and boldness about them. It was designed to entertain and it did that with aplomb.

It was a product of a time when something just felt right about games. The fun hasn't gone out of gaming, but it's never been so pure. It's a great machine that never let me down. ★

History of Apple

With Apple now in its fourth decade, Craig Grannell explores key products from its history, the impact they had on gaming, and the sometimes surprising impact that gaming had on Apple itself

Given Apple's gargantuan profits and global reach, it's easy to forget it started life as two people in a garage. Much of the tech wizardry back then was down to Steve 'Woz' Wozniak, while Steve Jobs was tactician and visionary.

The first breakthrough occurred in 1976, with what would become the Apple Computer 1 (later referred to as Apple I). The machine was offered to HP, which declined, and so Apple Computer was born. Apple already was 'thinking different', its debut hardware being the first single-board computer, sold fully assembled and utilising a television for output.

But Woz was thinking bigger. Inspired by his work on arcade games, he wanted to create a computer that was faster, more colourful and noisier than anything else. Ultimately, as he recalled in a 1986 interview with *Call-A.P.P.L.E.*: "A lot of the features of the Apple II went in because I had designed *Breakout* for Atari. I had designed it in hardware. I wanted to write it in software now."

With Apple rarely being equated with gaming, it's surprising to discover its foundations rest on one man's desire to 'program a BASIC version of *Breakout*'. But soon Woz was tinkering with his computer, adding colour, BASIC commands, paddle controllers, and sound. Building primarily for himself, he was also kickstarting a computing revolution – the Apple II captured the imagination of wannabe home programmers, and the machine's initial success bankrolled Apple for years.

Prior to founding EA, Trip Hawkins was director of strategy and marketing at Apple Computer, and recalls the Apple II fondly. "It was so far ahead of its time that photographers setting up images of the future would include an Apple II in the shot because it looked like it came from the future, not the present!" *Ultima* creator Richard Garriott was similarly impressed. He'd previously battled with teletype terminals, but then found himself sat before an Apple II.

"I was in wonder. Suddenly, instead of invoking a command and waiting minutes for it to process and print the results, I had a computer that in real time could visually display to me any fantasy worlds and other fantastical ideas I could think about to program. I immediately saw it as the key to the future – or my own future, at least!"

There were, naturally, drawbacks. Woz's products had their quirks, and the Apple II needed someone to make the most of it. "You had to be a great assembly language programmer and that kind of person is often not a great designer or artist," mulls Trip. "Brilliant talents like Bill Budge could envision bigger ideas and were able to execute in an interdisciplinary fashion, as he did with the revolutionary *Pinball Construction Set*."

However, many programmers found much of the pleasure in using an Apple II arrived from working out how to coax tiny gaming universes out the machine. "It was the first computer with decent graphics yet also simple enough that you could hold a model of the entire machine in your head," explains *Wizardry* creator Robert Woodhead. "Programmers knew everything about the platform, and part of the fun was figuring out ways to 'cheat' and get the machine to do stuff. One example was Woz's hack of using software to do all the expensive stuff needed to run a floppy disk controller, making the hardware simple and cheap, and then his 're-hack' that increased disk capacity entirely via code changes!"

At the time, no-one felt constrained by the perceived limitations. *Bard's Tale* creator Michael Cranford ponders it "was what it was", and that "having a fixed, limited canvas can be an inspiration to something better". He notes that with today's hardware, the lack of limits make it tough to push hardware and inspire people. Similarly, Jon Romero enjoyed the Apple II's "peculiar limitations", which he reckons dictated what you could create. This gave games on the system a certain character, utilising individual techniques that could "literally provide you with unique identification of a programmer".

The hardware continued to evolve, but internal politics eventually derailed the Apple II. An attempt ▶

> **"Apple II programmers knew everything about the platform"**
> Robert Woodhead

» The childhood home of Steve Jobs has now been added to the list of historic sites in Los Altos.

▶ at a business-focused follow-up, the Apple III, was a failure. And although the Apple II line eventually transformed into the next-generation Apple IIGS, it lacked a champion and was superseded by the Macintosh. Even so, that didn't stop people wanting to create games for the Apple II in its twilight years. Having used his Apple II to create *Karateka*, Jordan Mechner unveiled *Prince Of Persia* on what was considered a dying platform. His reasoning? "The Apple II was a platform I understood – it was a lovely machine."

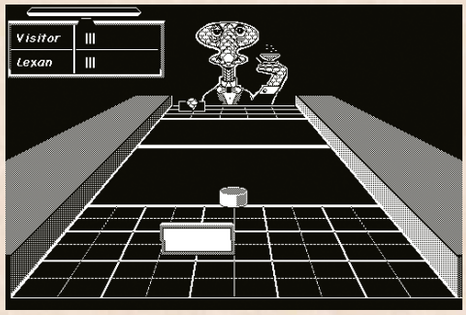
The early days of the Macintosh were fraught with problems. Even today it's hard to get a handle on precisely which events occurred and in what order, on account of the people involved having very different recollections of what actually happened. The basic facts, at least, are that the project was started by interface expert Jef Raskin, who wanted to create a consumer-oriented low-cost computer named after his favourite apple, the McIntosh. Over time, the scope of the Mac shifted, Steve Jobs jumped on board from the beleaguered Apple Lisa project (causing Raskin to quit), and the boxy little Mac finally said 'hello' in 1984.

Although the Mac was different from Raskin's concept, aspects of his vision remained intact. Inspired both by technology developed at Xerox PARC and also in-house at Apple, the Mac boasted a revolutionary visually-oriented operating system, based around a now-familiar desktop with windows and folders. The all-in-one main unit had a small but sharp 512x342 pixel display. And the only things you needed to plug in were a power cord, keyboard and mouse.

Much like the Apple II before it, the Mac offered a bold take on the future of computing, and people couldn't help but be seduced. "It struck me as a qualitative shift," recalls Christopher Gross, who designed air hockey titles *Shufflepuck* and *Shufflepuck Café* for the system. "The graphical interface and mouse allowed a shift from 'asking the computer to do something' to just being able to do it." In other words, this was a computer designed to enable users to perform actions directly, rather than type commands and hope for the correct interpretation to take place. Christopher was so taken aback that he quit a computer science grad program, because "programming for the Mac was so much more interesting and real than anything I was doing in school".

> **"I remember being disappointed at how few games were made for the Mac"**
> Christopher Gross

Quickly, though, the Mac found a niche and it certainly wasn't games. "Macs soon became mostly used for desktop publishing and artwork," remembers Jon. "They became typecast." And in wanting to stop its computer from failing, Apple did little to dispel this notion, reasoning that any focus on games might find its hardware dismissed as a toy. In a piece of insight mirroring how developers initially found getting to grips with the iPhone tricky, Christopher notes those few who did start working on Mac games rarely tried to innovate with the controls they found available to them: "Having a mouse by default didn't really shake things up. I remember being disappointed at how few games were made for the Mac, but also how few used the mouse beyond the most obvious ease of being able to directly point at things on the screen." This was in part what drove Christopher to use the mouse as a games controller in *Shufflepuck*. The game was also 'blessed' with the happy accident of 'weight' being afforded to the puck through a time delay in the graphics that occurred whenever a sound played as the puck was hit!



» *Shufflepuck Cafe* was a killer app for the early Macs.

Bill Dugan, at the time a producer at Interplay, also recalls issues with Apple's lack of interest and the system's reliance on the mouse. "Computer games were developed on a lead platform, released immediately and ported to whatever other platforms would sell," he begins. "The Apple II or C64 was usually the lead platform in the USA, and you'd then see ports to the PC, Mac, and other systems. Publishers wanted ports to be fast and cheap." For some platforms, a low-cost approach worked reasonably well, but this was less so for more powerful platforms, due to the

Selective Timeline

1 APRIL1976
■ The now-corporate giant that is Apple is founded by Steve Jobs, Steve Wozniak, and Ronald Wayne.

11 APRIL 1976
■ Apple Computer 1 (later known as the Apple I) is released, each unit hand-built by Steve Wozniak.

10 JUNE 1977
■ The Apple II is launched, and its success bankrolls Apple for a decade, giving the company breathing space.

19 MAY 1980
■ The Apple III hits the market and fares poorly, not least due to iffy Apple II compatibility. It was later reintroduced in 1981.

19 JANUARY 1983
■ The Apple Lisa launches. The UI was revolutionary, but the computer was sluggish, and the sales were poor.

22 JANUARY 1984
■ The Ridley Scott-directed *1984* ad plays at Super Bowl XVIII. It's hailed as one of the best adverts of all time.

Key Players

The people who shaped Apple

STEVE 'WOZ' WOZNIAK

■ Cofounder, engineer

An amazing engineer, Woz was the brains behind the Apple I and Apple II computers. Although still technically an Apple employee, Woz has had little to do with Apple since the mid-Eighties.

STEVE JOBS

■ Cofounder, CEO

Steve Jobs saw the potential in Woz's work, and became Apple's vision and taste arbiter. Ousted in 1985, he went on to found NeXT, he then triumphantly returned to Apple as CEO in 1997, reinvigorating a then-flailing company.

Photo of Steve Jobs © Matthew Yohe

JEF RASKIN

■ Interface expert

Although many people were responsible for the original Mac, Jef Raskin instigated the entire project, noting computers at the time were for geeks, and wanting to create something that was much more usable and friendly.

SUSAN KARE

■ Graphic designer

Graphic designer on the original Mac computer line, Susan Kare created the icons, typeface and interface conventions that permeated throughout the entire tech industry and that are still in use today.

Photo of Susan Kare © R. J. Muna

JONATHAN 'JONY' IVE

■ Designer, Chief Design Officer

An Apple employee since 1992, British-born Jony Ive flourished after Steve Jobs returned. Chief designer of the iMac, iPod, iPhone and more, Jony Ive's creations influenced the entire tech industry.

expectations of those who owned them. And with the Mac, the default interaction was pointing and clicking, not keyboard commands. Direct game ports to Mac therefore had a tendency to feel alien, lacking a mouse interface, or having a 'fake' one awkwardly welded on. "You'd essentially click on keyboard command equivalents. In the lower levels of the code, the programmer could then pretend there was no mouse at all, and use the same interface code that had been written for a non-mouse original," explains Bill.

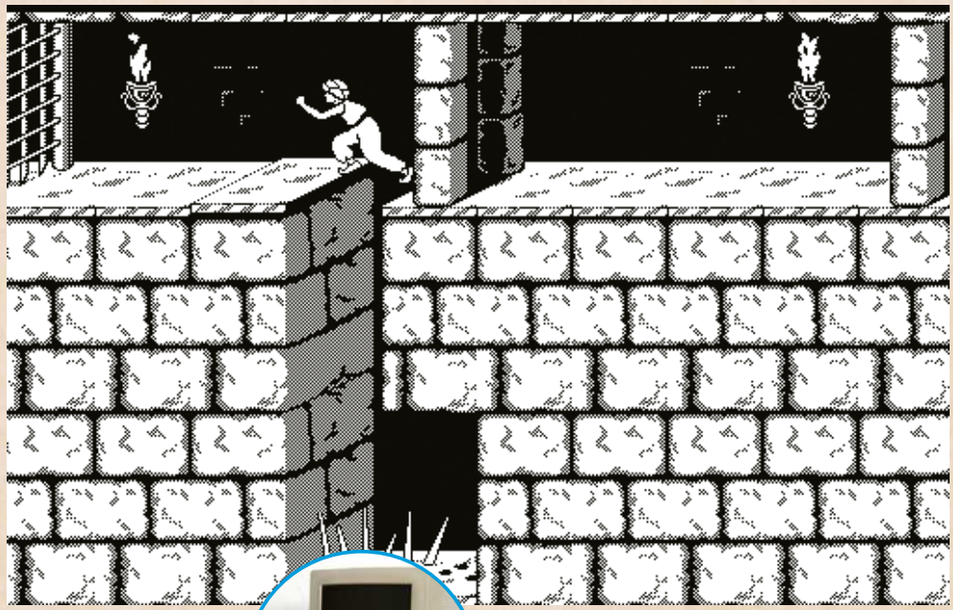
The display was a brighter spot. Christopher notes that it was "high-res, which allowed a relatively high mouse resolution", and Bill says its monochrome nature forced anyone porting games to take care. "The Mac's black-and-white monitors made it unconscionable to copy and paste graphics from another platform. You'd have ended up with an awful, lumpy mess of unacceptable grey. So pretty much everyone recreated graphics for the Mac." Having noted all these things, and with the Mac press howling at terrible ports, Interplay hit upon the idea of making an effort on presentation, UI and graphics, thereby making games more Mac-like and attractive. The MacPlay label was born. But, from a games perspective, the port was something the Mac would now only rarely escape from.

As years passed, the Mac solidified its hold on desktop publishing and creative industries, but ceded most other ground to PCs. "And as a big fan of the Mac and an avid games player, I became frustrated I couldn't play more games," says Peter Tamte, who co-founded MacSoft to redress the balance. Peter's team approached publishers to license rights and bring their games to the Mac. "And after showing how these games generated profits for their original publishers, and brought in new fans without diluting their brands or PC revenues, we were able to bring more and more games to the Mac from a wider selection of developers."

Apple wasn't blind to these issues, and there had been efforts to boost Apple's profile in gaming. Craig Fryar worked in evangelism at Apple during the Nineties and exposed senior management to key games. "When they saw the likes of *PGA Tour* and *Sim Ant,* they were amused, and the point wasn't lost on them that games could show off a system's horsepower."

Craig says things started changing, and he was able to secure hardware to feed to developers, along ▶

» *Prince Of Persia* had stunning animation. A colour version was eventually released on later Macintoshes.



24 JANUARY 1984

■ The first Mac arrives, providing the foundation for Apple's subsequent personal computing endeavours.

17 SEPTEMBER 1985

■ Steve Jobs resigns from Apple, and starts work on new venture NeXT, Steve would return to apple in 1997 as CEO.

15 SEPTEMBER 1986

■ The Apple II hits its zenith with the IIGS, which blends the Apple II and Mac experiences and uses a colour GUI.

2 MARCH 1987

■ The Macintosh II arrives, for the first time bringing colour displays to the Macintosh line of computers.

17 MARCH 1988

■ Apple sues Microsoft for copyright infringement relating to the Mac OS and Windows interfaces.

20 SEPTEMBER 1989

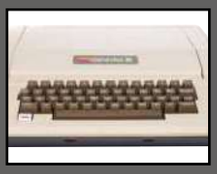
■ The Macintosh Portable becomes Apple's first battery-powered portable Mac. It didn't sell to well despite critical acclaim.

The influence of Steve Jobs

Steve Jobs impact on gamers is still felt today. Here are just a few of the developments he was involved in…

Apple Macintosh

The Macintosh was a huge influence during the Eighties, and has continued to evolve. At the time it was the first commercially succesful computer to feature both a mouse and a GUI.

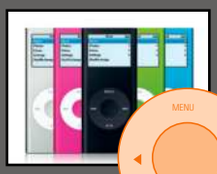


Apple II

The Apple II was first released in June 1977 and had various revisions. Many American developers, such as John Romero, Richard Garriott and Jordan Mechner learned to code on it.

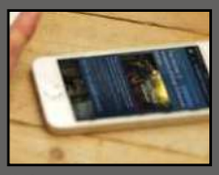
Pixar

Formed in 1979 as the Graphics Group, Steve Jobs bought Pixar from Lucasfilm in 1986, eventually selling it to Disney for roughly $7.4 billion, making him Disney's largest shareholder.



iPod

The iPod not only revolutionised the way we listened to music, but also the music industry itself. As with many Apple products it was continually refined over the intervening years.

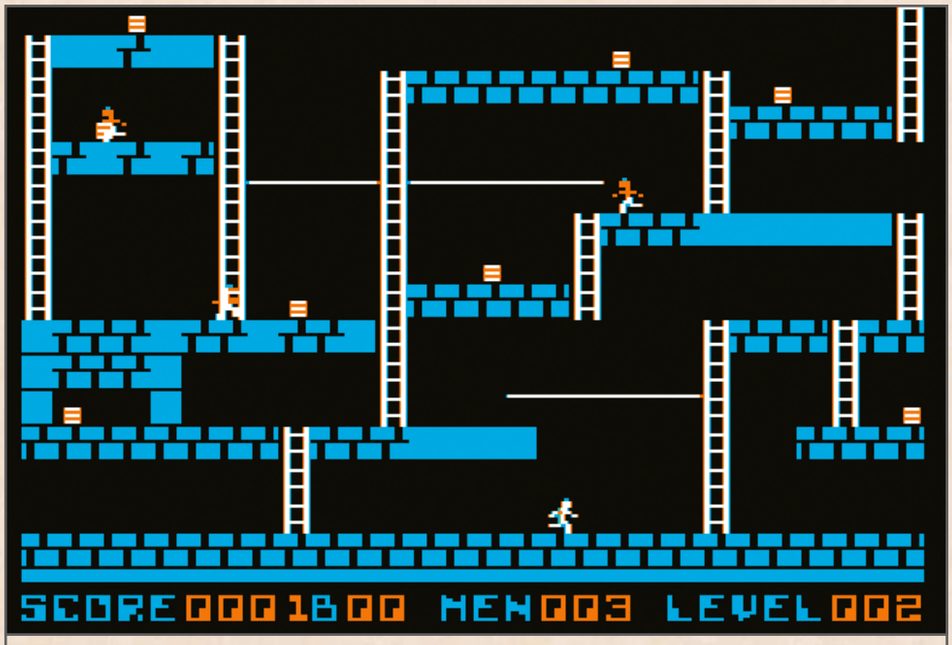


iPhone

The iPhone had a massive impact on the mobile phone market, and was one of the first devices that genuinely allowed you to play 'proper' videogames without any fiddly buttons.

iPad

Apple's iPad wasn't the first tablet device, not by a long shot. It did, however, change the way tablet devices were perceived by the general public. It has gone on to sell millions of units.



» The superb *Lode Runner* is one of the Apple II's most recognisable games.

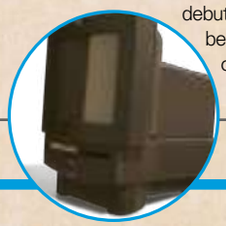
▶ with demonstrating new technology in exchange for games incorporating key features. One example was *Hellcats Over The Pacific*, a flight sim developed by Parsoft Interactive: "They were shown a system able to support multiple monitors out of the box. In return for them getting the hardware, they created a three-display 180-degree version of *Hellcats*, which was great for showing off the system. We got serious bragging rights, because at the time this just wasn't possible on a PC."

Erik Klein was working as an evangelist at the time, and remembers a slow turnaround in perception. "Games companies fondly remembered the Apple II days, but didn't think they could make money on the Mac. It was a difficult task, because you had new audiences to market to, different channels to sell the product, and different press to woo. But we did prove there was a market, which almost doubled in terms of sales during my time at the company. This was especially the case during the transition to PowerPC chips, which helped the Mac become a powerful system that could run state-of-the-art PC ports."

Although ports remained the most common kind of Mac game, the platform did get the occasional first. Pioneering immersive CD-ROM adventure *Myst* debuted on the Mac, primarily because it had been developed on the platform, utilising HyperCard (a sort of localised proto-web, with a card-based system housing interactive components) and Apple's QuickTime video technology. Another Mac first was *Marathon*, an innovative and exciting FPS that you'd have usually expected to instead arrive fully formed on the PC.

> **"We did prove there was a market, which almost doubled in terms of sales"**
> Erik Klein

Bungie co-founder and *Marathon* developer Alexander Seropian remembers being drawn to the Mac because of how visual it was. "I was jealous of all the games you could get on the PC. Gaming on that platform was growing tremendously, and there was this pent-up demand for games on the Mac that wasn't being addressed." Hence *Marathon*? "Well, I'd like to say that was a conscious strategy on our part, but the reality is the Mac was what we used and liked, so we chose to work there out of convenience more than anything else! But the Mac community was very receptive to *Marathon* – we'd travel the country visiting user groups and going to Macworld shows. We met many gamers who helped inform what we were putting into the game." ▶



21 OCTOBER 1991

■ Three new PowerBooks, with dark grey cases and built-in trackpads, provide a blueprint for notebooks.

16 AUGUST 1993

■ Digital assistant Apple Newton is released. Innovative but flawed, it would be axed by Steve Jobs in 1998.

25 OCTOBER 1993

■ Macintosh TV becomes Apple's first crack at integrating computers and TVs. Few are made and sold.

14 MARCH 1994

■ Power Macintosh arrives, based on the PowerPC processor created by AIM (Apple-IBM-Motorola).

28 MARCH 1996

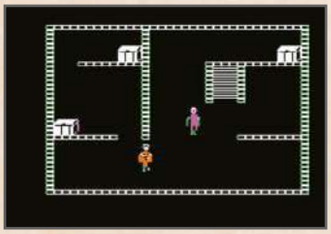
■ Pippin appears to universal indifference. Apple's first stab at gaming hardware is very quickly discontinued.

7 FEBRUARY 1997

■ Apple finalises a deal to acquire NeXT, which brings Steve Jobs back to the company he cofounded.

Core gaming

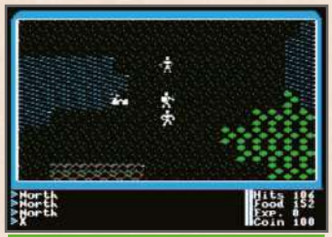
Ten games that defined Apple systems



CASTLE WOLFENSTEIN

■ Apple II ■ 1981

Silas Warner's stealth-based arcade game finds you deep inside a castle full of armed enemies during World War II. Its combination of tense moments, strategy and arcade smarts won it plenty of fans.



ULTIMA

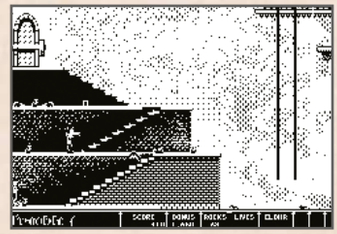
■ Apple II ■ 1981

Following up on debut title *Akalabeth*, Richard Garriott used his Apple II to fashion the first step in the *Ultima* series. One of the earliest open-world RPGs, *Ultima* has influenced countless games throughout the years.

CHOPLIFTER

■ Apple II ■ 1982

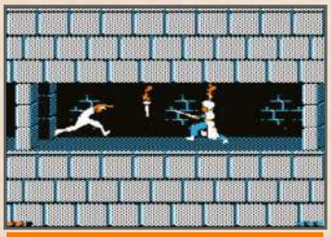
Initially an experiment in creating a controllable helicopter on an Apple II, *Choplifter* soon integrated *Defender*-style rescues. The game's seemingly political nature was coincidental, but spotted by the masses.



DARK CASTLE

■ Mac ■ 1986

This game took advantage of Mac hardware, utilising both keyboard and mouse, the latter used to launch projectiles, and the former for movement. The game shows how the Mac's graphical limitations can still reap rewards.



PRINCE OF PERSIA

■ Apple II ■ 1989

Karateka's take on side-on fighters wowed on the Apple II, but with *Prince Of Persia* Jordan Mechner went one better, your hero carefully working his way through dungeons to save a princess. Realistic animation and challenging gameplay cemented the game's classic status.

MYST

■ Mac ■ 1993

This adventure puzzler is perhaps best-known for being a PC game, but it started life on the Mac. The original was built in HyperCard, and Apple's release of QuickTime part-way through development enabled an extra degree of immersion through the integration of video.

MARATHON

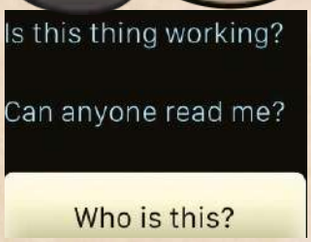
■ Mac ■ 1994

With the Mac still mostly known for serious work in the Nineties, most games were static and staid. *Marathon* bucked the trend, bringing cutting-edge FPS action to the platform, marrying blasting with a detailed plot. Bungie would, of course, go on to create *Halo*.

ESCAPE VELOCITY

■ Mac ■ 1996

With Mac games being few in number as Apple hit its nadir, space opened up for enterprising indies. One of the best examples is *Escape Velocity*, a space trading game that resembles *Elite*, albeit with a third-person view during the outer-space travel sections and battles.



ANGRY BIRDS

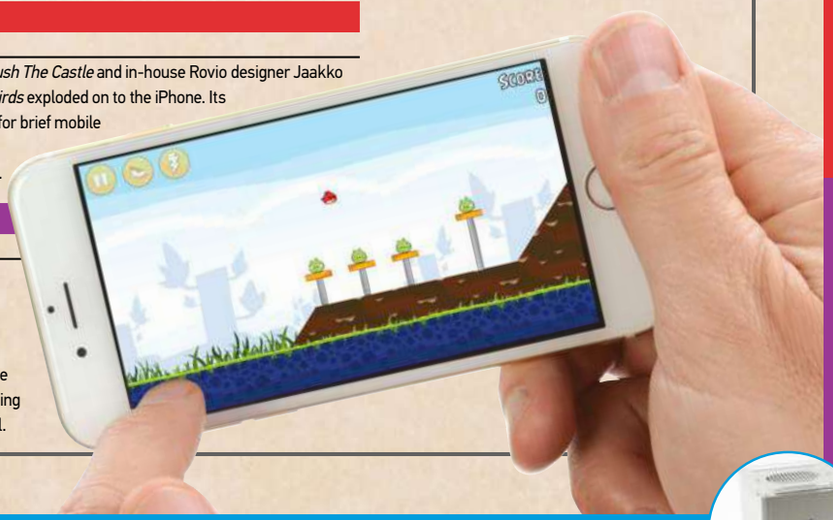
■ iOS ■ 2009

Obviously inspired by online flash game *Crush The Castle* and in-house Rovio designer Jaakko Iisalo's designs of limbless avians, *Angry Birds* exploded on to the iPhone. Its bite-sized slingshot gameplay was perfect for brief mobile sessions and touchscreen control, quickly catapulting the game towards iconic status.

LIFELINE...

■ Apple Watch ■ 2015

The first of a new generation, *Lifeline...* is a game that actually works better on Apple Watch than a smartphone. Essentially a *Choose Your Own Adventure* with you assisting a stranded astronaut, the narrative is compelling and has emotional clout. Playing on a watch feels oddly futuristic and natural.



7 MARCH 1997

■ The eMate, based on the Newton, finds Apple attempting to appeal to the education market.

20 MARCH 1997

■ The Twentieth Anniversary Macintosh is released. It's ostentatious, yet foreshadows future consumer tech.

7 AUGUST 1997

■ Microsoft comes to the aid of a struggling Apple, giving it a cash injection and boosting its confidence.

15 AUGUST 1998

■ Apple wows the tech industry with the audacious iMac G3. Its translucent shell becomes a meme.

21 JULY 1999

■ The iMac goes mobile with the iBook, a colourful, friendly notebook with surprising tech smarts.

19 JULY 2000

■ The Power Mac G4 Cube proves a step too far regarding marrying design and computing. Sales are poor.

Pipsqueak

Apple versus its rivals

Pipsqueak
Apple vs. Microsoft

■ Microsoft started out as a Apple ally but Windows drove a wedge between the companies. Apple fumed at Microsoft's perceived plagiarism, but many lawsuits later Apple was almost bankrupt. In 1997 Microsoft injected cash and shored up its ailing rival, seemingly to retain 'competition'. Apple subsequently blazed past, predicting and driving consumer hardware trends in a way Microsoft couldn't match.

Pipsqueak
Apple vs. IBM

■ Big Blue killed any hope Apple had of mainstream success in the Eighties. The PC's arrival in 1981 provided an affordable alternative to anything Apple had to offer. But, over time, the rivalry thawed, showcasing the tangled relationships between tech companies. For years, PowerPC chips from an Apple-IBM-Motorola alliance were found in Macs. Today, Apple and IBM are increasing the iPad's corporate reach together.

Pipsqueak
Apple vs. Samsung

■ One of the oddest modern-day tech relationships, Samsung and Apple are both butting heads and yet are reliant on each other. Samsung still manufactures many Apple device components, and has spent many years merrily being 'inspired' by the iPhone and iPad. Additionally, Samsung's TV ads often rip into Apple, arguing its customers are brainless fools taken in by Apple's marketing machine. Long-term, expect Apple to split entirely from Samsung.

Pipsqueak
Apple vs. Dell

■ One of the most famous tech quotes of all time occurred in 1997 when Dell CEO Michael Dell opined if he was put in charge of Apple he would "shut it down and give the money back to the shareholders". He argues this was misunderstood and that he was mulling from the position of still being Dell CEO. Still, it showcased a stark difference in thinking between the two organisations.

Pipsqueak
Apple vs. Adobe

■ Once, Apple and Adobe were close. But as Apple's grip on the design industry loosened and Adobe became more bullish, cracks appeared in the relationship. This came to a head when Steve Jobs refused to support Flash on iOS, arguing it was unstable technology. Adobe griped Apple was taking away people's freedoms, but, in reality, Flash was terrible on mobile. Apple eventually won the battle, and Flash's presence online is rapidly diminishing.

▶ Far from an also-ran, *Marathon* helped define what a FPS could be. It focusses more on narrative, using levels to tell a story, and had one of the earliest 'free look' systems. Naturally, it became a major influence on Bungie's *Halo*, although it didn't go as far as to revolutionise Mac gaming. Instead, Mac ports would increasingly arrive when PC originals hit the bargain bin, and Apple in 1996 made a misstep with its only full foray into Mac-based dedicated gaming hardware, the risible Pippin, which was poorly architected, overpriced and lacking in developer support and consumer interest.

In fact, around that time it looked like Apple might vanish entirely, and buy-out rumours regularly circulated. Pangea's Brian Greenstone recalls "developers left in droves," which was good for Pangea and the few others who "became big fish in a small pond for a while". But questions started to be asked whether Apple could recover. Its future looked bleak.

It was co-founder Steve Jobs who arguably saved Apple from the brink. Having in 1985 quit the company he founded, he returned, ruthlessly culled a messy product line, and set Apple on the course it still finds itself on today. This sleeker, leaner Apple prized high-quality hardware that appealed to consumers and pros alike. From a games perspective, though, it's arguable the Mac never bounced back. "By the time Apple recovered, there was no-one left, except for a few companies porting two-year-old PC games, and a few of us still making original Mac games," says Brian. "Games development had gotten so expensive and the Mac's market share was so small that it wasn't feasible to keep developing games for it."

» *Saucelifter* for iOS harks back to and subverts Apple II classic *Choplifter*, with an alien rescuing kin from evil humans.

It would need an entirely new platform to transform Apple's fortunes in gaming. It would need the iPhone. Initially dismissed by the tech industry and pundits alike as an overpriced trinket, the iPhone and its multitouch display was an instant hit with consumers. The

> "There was no-one left, except for a few companies porting two-year-old PC games"
> Brian Greenstone

» The iPad was first released in 2010 and has become an incredible success for Apple.

9 JANUARY 2001
■ iTunes appears, initially as an MP3 player. It evolves to be a cornerstone of Apple.

23 OCTOBER 2001
■ Apple revolutionises portable music with iPod, bettering existing players in terms of UI and storage.

31 AUGUST 2004
■ The iMac goes all-in-one, essentially a monitor with a chin. All subsequent iMacs follow this design.

9 JANUARY 2007
■ Apple TV kickstarts Apple's so-called 'hobby' product, muscling in on the space under your telly.

29 JUNE 2007
■ iPhone upends the entire mobile phone industry, with a revolutionary interface others soon clamour to ape.

15 JANUARY 2008
■ Steve Jobs pulls a notebook out of an envelope at a keynote. MacBook Air invents the term 'Ultrabook'.

» Apple's range of home computers and notebooks may be expensive, but they're easy to use and highly versatile.

groundbreaking smartphone marked a turning point in the industry, forever changing how you interacted with devices. Initially, third-party apps weren't part of the picture, although a community flourished to support 'jailbroken' iPhones freed from Apple's restrictions. A year after the iPhone's release, all bets were off: the App Store arrived and with it a gold rush that the software industry had never before experienced.

Steve Demeter's *Trism* utilised the iPhone's accelerometer, the player moving triangular tiles about in a variation on popular match puzzlers. Within two months, Steve had made over $250,000 from an investment of some spare time and paying a designer $500. Elsewhere, rhythm game *Tap Tap Revenge* hit a million downloads two weeks after launch, reaping huge rewards from in-game advertising. Major developers also clambered on board, trying to make sense of this new platform, Sega perhaps doing so most successfully with a tilt-based *Super Monkey Ball*. The trickle became a flood, and suddenly Apple found itself with if not a games platform then at least a platform people were playing an awful lot of games on.

Sometimes, the tide turned. Apple struggled with censorship issues, banning titles for seemingly arbitrary reasons. A small handful of games began to dominate the charts, making life tough for indies. And then free-to-play mechanics spread throughout the platform like a virus, robbing many games of their purity.

Even so, iOS (the platform that now encompasses iPhone, iPod touch and iPad) has many positives, not only for Apple (given that the games category is typically the App Store's most profitable), but also for developers. Veteran coder Ste Pickford reasons that iOS lacks gatekeepers in the way most other platforms don't: "There's no concept approval, where someone decides whether or not your game can be released. We became indies because we wanted the freedom to design videogames without being limited to what marketing departments wanted to sell!" Vlambeer's Rami Ismail adds that iOS also remains a way to potentially reach a huge audience, without requiring massive investment: "There are few barriers to entry, although the platform does have a problem with clones, which can seriously knock your motivation if your game is ripped off."

Despite its success, there are many who question iOS's validity as a gaming platform.

"Anyone who says that is out of touch with gaming," argues games creator and artist Zach Gage. "Just about every major studio is developing for iOS, as are thousands of talented indie developers. And often, the freshest IP comes out on mobile." Rami agrees: "I'm tired of people saying certain things aren't games. Beautiful things exist at the edge of what people would call 'videogames', and iOS has offered many such titles."

Now, Apple is setting its sights towards the living room again, with the Apple TV. The little black box is far from revolutionary, but could it herald another gaming revolution from the company that often pretends games don't exist, despite its first hardware hit being built to play one? "I do find it ironic that in the Mac days, gaming was such a low priority for Apple, but now with its mobile systems, gaming is the biggest usage and revenue driver on those platforms," says Alexander, now-CEO of mobile games developer Industrial Toys. "Things have changed, and while a flooded market means it's a lot harder to get noticed, it's still a great time to be making games. And Apple's now a major player in that ecosystem, which is great to see." ✱

10 JULY 2008
■ The App Store radically transforms the iPhone's scope, ushering in an age of truly mainstream mobile apps.

3 APRIL 2010
■ iPad is launched. More or less a giant iPhone, it kickstarts a revolution in tablet computing.

5 OCTOBER 2011
■ Apple cofounder Steve Jobs passes away at the age of 56, having since 2003 battled pancreatic cancer.

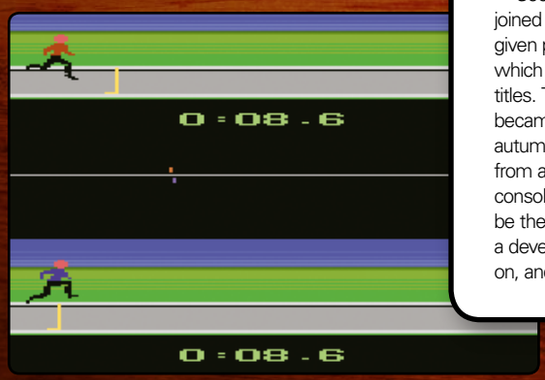
24 APRIL 2015
■ The Apple Watch releases and becomes Apple's first foray into wearable computing for the masses.

26 OCTOBER 2015
■ The fourth-generation Apple TV brings Apple apps to your telly, games sharing progress with their iOS siblings.

11 NOVEMBER 2015
■ iPad Pro and Apple Pencil positions themselves at the high-end iPad as a device for creators.

Atari

ALTHOUGH INTENDED TO HAVE A SHORT LIFESPAN, THE 2600 DEFIED ALL EXPECTATIONS AND STILL REMAINS POPULAR FOUR DECADES LATER. RORY MILNE CHARTS THE HIGHS AND LOWS OF ATARI'S PIONEERING CONSOLE



A major milestone in videogame history was marked in July of 1977 when the first Atari Video Computer System rolled off a production line in California. However, Atari's think tank – Cyan Engineering – had been discussing ideas for a programmable game system as early as 1975. In light of the long lead time required by the console – now better known as the 2600 – it's perhaps unsurprising that Atari recruited the first member of its launch games team – Larry Kaplan – almost a year before mass production began. "I was working in Silicon Valley, this is August of 1976, and Atari put an ad in the newspaper for programmers," Larry begins. "Atari at the time was a coin-op company, but there was a new consumer division – that was six people – and I interviewed with them to be a game programmer for their new system, the 2600."

Soon after, three additional coders joined Larry, and the small group were given preproduction hardware on which to develop the 2600's launch titles. This gang of four subsequently became six, and following the console's autumn launch, the team switched from assembly code to assembling consoles for what they thought might be the 2600's only Christmas. "We had a development system that we worked on, and the whole of 1977 was doing

» *Death Star Battle* lacks depth, but the Parker Brothers shooter is fun in short bursts.

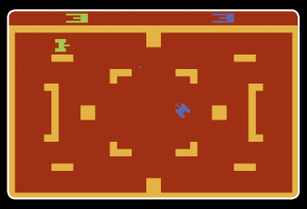
games," remembers Larry. "It was kind of a tough situation because production was way behind. So during Christmas, they actually made all the employees – including us engineers – work on the assembly line to keep up with orders. No one knew how long the 2600 would last, they assumed one Christmas, maybe two at most, and then we would move on to the next product. The launch titles were okay – there was *Combat*, and I did *Air-Sea Battle*."

Although not official coin-op conversions, these two launch games – and many of the other initial 2600 releases – were based on arcade favourites, which set the trend for Atari's 2600 output for 1978, as developer David Crane confirms. "It was ironic that we were tasked with making home versions of $3,000 arcade games on the lowly $200 2600, but as game programmers at Atari, we were

2600

CLASSICS

ATARI The creator and life-long supporter of the Atari 2600

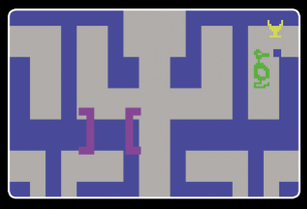


COMBAT

■ The 2600's first game, and the system's original pack-in title, *Combat* still represents a highly compelling competitive experience. Largely based on the coin-ops *Tank* and *Jet Fighter*, the two-player-only *Combat* is a top-down shootout against the clock featuring tanks, biplanes and jet planes where the player that destroys their opponent the most times is declared the winner. The game's 27 modes feature embellishments such as mazes, corner-turning bullets, invisible tanks and giant jets.

ADVENTURE

■ Widely considered to be the earliest example of the action adventure genre, Warren Robinett's *Adventure* was nothing short of a revelation when it was released in late-1979. Before *Adventure*, videogames had either one or a sequence of separate single-screen playfields, but Warren's game depicts a sprawling world using interconnected screen-sized locations. *Adventure*'s challenge is to return a chalice to a castle while battling dragons, dodging bats and negotiating pitch-black labyrinths.



YARS' REVENGE

■ Howard Scott Warshaw's debut caters for both casual players and hardcore shooter fans by offering difficulty settings ranging from slow and stripped-back to high-octane and full-featured. Its core gameplay tasks an insect-like Yar with avoiding a heat-seeking drone and depleting an enemy Quotile's shield before dispatching it with a long-range missile. *Yars' Revenge* also features an ion zone that's vulnerable to attacking Quotiles and disables the Yar's weapons but also provides protection from drones.

SOLARIS

■ Developed by Doug Neubauer, creator of *Star Raiders*, *Solaris* was a late, great Atari 2600 exclusive. The games have almost identical mechanics – each involves starfield navigation and cosmic shootouts, but *Solaris*' gameplay is less complex and its playfield is more expansive. *Solaris*' main evolution is that it allows you to land on federation planets for refuelling or to defend human colonies, and to invade alien planets and destroy them following the rescue of groups of space cadets.

ACTIVISION

The first, and arguably best, third-party 2600 publisher

PITFALL!

■ Curiously enough, *Pitfall!* is a platformer that doesn't really have platforms, but David Crane's classic contains more than enough platforming standards to justify its place in the genre. Specifically, hero Pitfall Harry has to jump over pits – naturally – swing on ropes over hazards, avoid creepy-crawlies, vault rolling logs and collect hidden treasure. Of course, the game's appeal lies in its implementation, which boasts smooth-scrolling, tight controls, well-constructed levels and slick presentation.

H.E.R.O.

■ Arguably the best Superman game never made, John Van Ryzin's *H.E.R.O.* was reworked when he discovered that Atari owned the DC Comics licence. Having a vulnerable hero led John to populate the sprawling mazes of his cave-based rescue mission with indigenous threats like bats and snakes. The vulnerability of the game's rocket-packed, laser-blasting protagonist also inspired the designer to arm his hero with dynamite that could potentially blow him up as easily as obstructive walls.

RIVER RAID

■ Technically a scrolling shooting gallery where opponents don't return fire, Carol Shaw's *River Raid* is never the less as tough as 2600 shooters come. The game's challenge lies in balancing conflicting objectives, so while navigating tight ravines and dispatching river and air-based enemies are primary considerations, these goals have to be reconciled with slower-paced fuel collection. Additionally, *River Raid*'s infinite amount of levels are algorithmically generated, so each one is unique.

PITFALL II

■ David Crane chose to go 'bigger and better' when following-up his massively popular 2600 platformer. As well being much expanded, *Pitfall II*'s playfield scrolls, rather than flicking from one self-contained screen to another, and allows downwards as well as sideways travel. Aside from enhancing *Pitfall*'s premise, the sequel's mechanical enhancements are something of a technical achievement, as is *Pitfall II* as a whole, and this likely goes a long way to explaining its glowing reputation.

THE SOFTWARE HOUSE

Activision's David Crane on the evolution of 2600 gaming

What did you initially think of the 2600 and its early games?
When I attended GameTronics 1976 in the San Francisco Bay Area, the Fairchild Channel F was featured there, and I played tennis with Alan Miller, who was working at Atari on Atari 2600 games. Based on discussions, he invited me into Atari to interview for a position making games there. I saw the potential and took the job. I saw the games at the time as indicative of what the system could do. I appreciated the way the Atari designers could think outside of the box in order to make the limited 2600 hardware play a diverse mix of games.

Why were so many early 2600 titles based on arcade games?
Atari's primary strategy for creating the Atari 2600 was to bring their arcade hits to the home. The 2600 hardware was designed to play *Tank* and *Pong*; it was made cartridge-programmable so Atari could sell two cartridges. Every other game made for the 2600 was a pleasant surprise for the hardware team. Not until most of the arcade games had been duplicated on the 2600 were we able to start thinking of original games.

Why was *Pitfall!* not followed-up sooner?
The impetus behind *Pitfall II* was a custom integrated circuit I designed that went inside the cartridge and expanded the capabilities of the 2600. With that chip, I brought the 2600 even closer to the theoretical 'new console in a cartridge' paradigm that had made the 2600 so successful.

How did it feel to leave 2600 development behind after *Skateboardin'* in 1987?
I always loved making games for the 2600. The challenges, while seemingly insurmountable, only served to make me more driven to squeeze more horsepower out of the system. *Skateboardin'* was a business opportunity to reach out to people who still loved and played the 2600.

How would you explain the 2600's lengthy commercial lifespan?
The 2600 was inadvertently far more capable than other consoles created in the Seventies and Eighties. It allowed more control over the game experience than systems where the hardware was more capable but more rigidly defined. The 2600 was in more homes than any other console. That fact alone made it the first choice for game creators.

"Al Miller wanted a royalty, and Ray [Kassar] said: 'No.' He said we were 'a dime a dozen'"

Larry Kaplan

» Given the 2600's limitations, Parker Brothers' *Q*bert* is a faithful adaptation of the coin-op.

▶ encouraged to port their arcade games to the 2600. *Outlaw, Canyon Bomber* and many others were based on existing arcade games."

Atari's policy of taking its lead from coin-ops proved popular, and this was reflected in sales of the 2600 quadrupling between 1978 and 1979. Pioneering designer Warren Robinett puts this growth spurt down to increased awareness and a rapidly expanding games library. "It takes a while for the word to spread about a new product that's good; that was probably part of it. And as the number of available games increased that probably increased the attractiveness of the 2600."

But while Warren's first 2600 game – *Slot Racers* – closely adhered to Atari's arcade-derived house style, his second – *Adventure* – spawned a new genre and introduced the concept of a world that couldn't be contained within a single screen. "I didn't set out to break the mould with *Adventure*," Warren clarifies, "but I found a new template. I thought that this text adventure game with a 'rooms and objects' concept – *Colossal Cave Adventure* – was cool, and I wanted to do that on the 2600. So I came up with this 'driving off the edge of the screen' thing, and that resulted in creating a much bigger world than one screen. But nobody told me I was inventing a new genre; it just seemed like one more 2600 cartridge."

But rather than praise, Warren's boss heaped criticism on him for creating *Adventure*, and the developer left Atari in 1979. Larry Kaplan explains why he and three colleagues followed suit later that year after a run-in with Atari CEO Ray Kassar. "Management kept claiming there were no profits. One big joke was that they had something called DBOI – 'Departmental Budget Operating Income'. We were supposed to share in that as engineers, but we ended up calling it: 'Don't Bet On It', because we never did. Warner was pouring money into Atari during 1979, and we were trying to figure out what to do. So we said: 'Lets go and see Ray,' because 2600 cartridges were selling in the millions. So Al Miller wanted a royalty, and Ray said: 'No.' He said we were 'a dime a dozen.'"

» *Keystone Kapers* played to the 2600's strengths, thanks to its simple, yet compelling, setup.

Subsequently, the four coders – Larry, Al, David Crane and Bob Whitehead – resigned and set up the first third-party console publisher, the output of which massively boosted the 2600's reputation, as David notes. "Because Activision initially featured the 2600, we made Atari's console into the de facto standard. But Activision's designers had to innovate or die. First, we didn't own any arcade properties to port, and second, we were the new kids and we initially had to struggle to create new games, a new trademark and a new business model. I know that we felt pushed by our prior work – feeling the need to make every game better than anything we had ever done before."

The drive to better their previous 2600 titles, the need to create original games and the cumulative knowledge they had accrued while at Atari resulted in Activision becoming a huge success in short order. The firm's fortunes ultimately persuaded the majority of Atari's remaining 2600 developers to establish or join third-party firms, and two years later, Atari had a fresh set of coders facing a steep learning curve, as Larry Kaplan points out. "After we left, the Imagic guys left and then the 20th Century Fox guys. By 1981, all Atari had, basically, were new people. The problem was that everyone who left already had three years of experience, so we knew how to do stuff – and those guys didn't. If Atari had given us royalties we would have all stayed there; it would have made a billion dollars, it would have been Nintendo. But Atari totally fucked it up. Us leaving split everything up, everybody had to reinvent the technology and there were all these suits going on. It was just a mess, and we could have all been doing games."

Despite the mess, Atari's former designers weren't alone in third-party 2600 development for long. Rex Bradford started coding *Empire Strikes Back* for Parker Brothers in 1981, and feels the console's best games emerged in the 18 months that followed. "It seemed to me like the 'golden period' of some of the best 2600 games was the second half of 1981 and 1982. It was certainly the period in which graphics techniques got refined. There were much better thoughts about how to reuse sprites multiple times on the screen in order to get better-looking displays. Also, by 1982, there were bank-switch cartridges for 8K games. *Empire Strikes Back* came out May 1982, or something. There hadn't been a huge amount of games out at that point, but Activision had published some of their great stuff – *Tennis* and *Ice Hockey*. ▶

CLASSICS

IMAGIC

The short-lived publisher that made the 2600 sing

DEMON ATTACK

■ An early Imagic release, and the subject of a lawsuit brought by Atari, Rob Fullop's *Demon Attack* became a bestseller for the third-party developer. Inspired by Namco's *Galaxian*, but closer to Taito's *Phoenix*, Rob's multicoloured shooter constantly reinvents its challenge by rotating a cast of winged opponents from round to round and tweaking their offensive capabilities on each repeat appearance. As well as varied gameplay, Rob's game boasts slick presentation and high-res sprites.

ATLANTIS

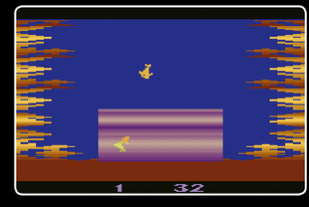
■ This shares elements with *Defender* and *Missile Command* – there are high-res foes that get faster and more numerous over time, and the hero's weapons are fired from three fixed locations at the foot of the screen. Superficial similarities aside, Dennis Koble's graphically impressive shooter doesn't play like either coin-op. The game's three lasers each fire in one fixed direction: up-and-left, straight-up and up-and-right, which makes timing and accuracy the keys to your success.

COSMIC ARK

■ The sequel to *Atlantis* – if you believe *Cosmic Ark*'s manual, but actually the two games only have a starship sprite in common. More importantly, Rob Fullop's title excels in gameplay terms by alternating between shooter and rescue mission, and becoming progressively harder from level to level. *Cosmic Ark*'s main appeal lies in its unpredictable cuts between shootouts in a mothership and beaming-up aliens in a drone ship, and from the interactions of these two disparate challenges.

FATHOM

■ Although in some respects a triumph of style over substance, *Fathom* does provide compelling gameplay and an interesting premise to complement its striking visuals. Specifically, the game has you switching between a dolphin collecting sea horses and a seabird collecting clouds in order to assemble a trident required to rescue Neptune's daughter from a prison on the ocean floor. *Fathom* is far from easy, but there is a smooth difficulty curve to its seven colourful stages.



THE GRAPHIC ARTIST

Artist Alan Murphy on the limitations of 2600 graphics

What were your first impressions of 2600 game visuals?
I first saw the 2600 when I was hired at Atari in 1980. I had been playing arcade games and wasn't too impressed with 'Stella', as the engineers called it. I actually thought most of the games sucked. Until Atari brought in artists, all art was done by programmers, most of whom had little or no art training. The art was so bad in most games you'd be forgiven for not wanting anything to do with them.

How did creating 2600 art compare to designing visuals for other systems?
I worked on 5200 and arcade games as well, so when I was assigned a 2600 game I would kinda groan. At first, everything was established on graph paper, and it wasn't clear if art or animation would even work until the programmer coded it. Later on, artists used an emulator, so we had a pretty good idea how art would look on the system ahead of time, and that proved to have a dramatic improvement on the quality.

Was designing high-res 2600 graphics more rewarding?
Of course I preferred high-res visuals, but it was a real pain in the ass to make anything look good on that piece of shit. As we used to say, it was like trying to draw with a bar of soap and your hands tied behind your back. *Bugs Bunny* was a little better: it had more memory set aside for the art compared to other 2600 games I had worked on.

How did you feel after moving on from designing 2600 graphics?
I moved over to coin-op after the video game crash in the early Eighties and quickly got into 3D, so I was no longer doing much raster art. I didn't miss it at all. Polygons were cutting edge in the Eighties, and my passion was 3D.

How do you feel now about your time as a 2600 artist?
It was a lot of fun; I was in the right place at the right time. What bothers me a little is that when people refer to retro gaming they don't think of the 2600 anymore. People think of Nintendo or even Sega. It's not a big deal, but early games on the 2600 don't get much credit.

» Although it sold millions, overproduction of *E.T.* resulted in huge losses for Atari at the time.

> **"The 2600 games themselves received more intense effort in development"**
> Rex Bradford

▶ And *Stampede* showed what you could do if you paid attention to how to lay out your screen. I was studying them to get a sense for what was possible, and certainly *River Raid*. A lot of people were learning from one another. Then *Pitfall!* was the breakthrough game, but there were certainly many good ones that came out in the 1982 timeframe."

But while the 2600 hosted a wealth of great titles during 1982, it was far from the most advanced system available. Rex largely credits the 2600's success to the fact that its games punched above their weight. "Parker Brothers were working on the Intellivision at the same time, I remember it had superior graphics capability. Although it may not have been fantastic, by that era it was quite good. A lot of factors go in, but the 2600 games themselves received more intense effort in development. I think the focus of Activision had a big role in that, because they came out with some really good 2600 games early on that fired people up and created some momentum. There was a progression where the games just got better. It was an exciting time to be buying games as well as making them."

Despite its superior competition, Howard Scott Warshaw – a star among Atari's second wave of 2600 coders – produced a trio of million-selling 2600 games during this exciting period. "At the 2600's peak, I don't know if the other consoles were as distributed, because things were already kind of declining at that point," Howard reflects. "The other consoles were definitely better, but were they enormously better? The 2600 was the one that got the major distribution first. That gave it momentum; that's where most of the games were, the largest games library. The Commodore 64 and Intellivision were far more capable systems, but they also had a lot of operating system overheads. There were a number of things that interfered with them really being spectacular advances. When you looked at their games they didn't look that much more spectacular than 2600 games. So they didn't have that 'wow' impact, that's why I think there wasn't much of a threat. You look at *Yars' Revenge*, which was the first game that I did, I think I definitely saw some things in a new way or was able to produce a few things that were high-impact. Which was where I was coming from. I wanted something that was going to grab the eye and the attention, and then hopefully this fun spirit."

As 1982 drew to a close, however, two unexpected events loomed on the horizon that when combined would all but end 2600 game development: the announcement of a $1 billion dollar loss at Atari and the collapse of the entire US videogames market. Larry Kaplan blames Atari for these related events. "By the time I came back to Atari, Ray Kassar had started paying royalties. And so, Tod Frye got a dime a cartridge and made a million dollars. Howard Scott Warshaw made $2 million. But the 2600 was very limited in what it could do; *Pac-Man* was just something we never would have attempted at Activision. And then the whole thing with *E.T.* – that was just silly. Nobody in the world could do an original game from scratch in six weeks. And the *E.T.* movie wasn't much of a videogame concept, but I gave Howard credit to actually finish it. But *Pac-Man*, *E.T.*, Atari doubled the price of those things – it charged $40 instead of $20. To a large extent, that destroyed the industry. Videogames were done. Atari lost a billion dollars in 1982. You know, it went crazy. It had all these huge projects it was working on, but it missed the 2600, and making good games for it."

When asked about his 2600 *Pac-Man* port, Tod Frye is broadly philosophical, and takes the view that the game shouldn't shoulder too much blame

CLASSICS

PARKER BROTHERS

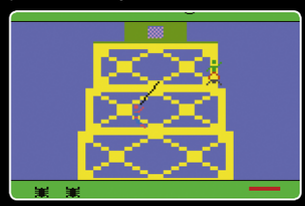
The licensing pioneer that played to the 2600's strengths

STAR WARS: THE EMPIRE STRIKES BACK

■ Based on the *Star Wars* sequel's set-piece Battle Of Hoth scene, Parker's *Empire Strikes Back* puts the player in the pilot's seat of a snow speeder and pits them against an unstoppable fleet of imperial walkers. In terms of gameplay, *Empire* clearly takes influence from Williams' seminal coin-op *Defender*, but its focus on attacking one gigantic foe at a time instead. It's a great game that's still fun to play.

SPIDER-MAN

■ Although it borrows from the coin-op *Crazy Climber*, *Spider-Man* distinguishes itself by having Spidey web-spin rather than crawl up skyscrapers. Thugs appear at windows and try to cut the hero's webs, but swinging into them tops-up limited web-fluid supplies. The superhero's webbing is also replenished by defusing bombs set by the villainous Green Goblin, but the game's main appeal lies in trying not to fall and correcting falls by snagging buildings with a web as Spider-Man plummets to the ground.



FROGGER

■ One of the most fondly remembered Atari 2600 arcade conversions, Parkers Brothers' adaptation of the Konami smash-hit coin-op is about as accurate as 2600 owners could have possibly expected. In terms of concessions, *Frogger* on the 2600 has more rudimentary graphics than the original and lacks in-game music, but more importantly, Parkers' translation faithfully replicates the arcade classic's gameplay. The Atari 2600 port also offers long-term value with its frenetic 'Speedy Frogger' mode.

FROGGER II: THREEEDEEP

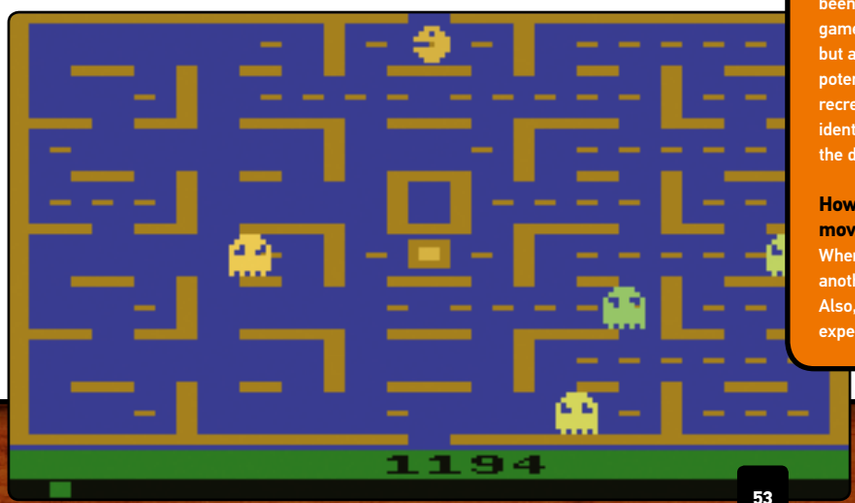
■ For its *Frogger* follow-up, Parker Brothers wisely chose to use the arcade original as the basis for three distinct stages featuring fresh visuals and mechanics. The trio of tweaked levels share the original game's objective of safely ascending the screen, but with tweaks to the specifics of how you achieve this goal. The first two stages play like expanded ocean-based versions of *Frogger*'s river and road sections, while stage three involves bouncing Frogger skyward into screen-top clouds.

for Atari's financial misfortunes or the US videogames crash of 1983. "I think the degree to which *Pac-Man* was responsible is exaggerated. I think if there was a factor it might have been something along the lines of disenchantment with videogames. I don't think that *Pac-Man* was anything more than a fellow traveller in that area, one of a whole trend of disillusionment. A lot of people really loved the game, but there was a momentum; the press hated the shit out of it. And then *E.T.* hot on its heels, which did not help – Howard was given like five weeks to make *E.T.* So the Atari brand was besmirched by 1983."

On *E.T.*, Howard Scott Warshaw explains the main problem with developing his 2600 movie adaptation in a little over a month, and on the crash, he recalls Atari's blinkered response to the 2600 games market imploding.

"*E.T.* was really kinda proof of this: you can do a decent job of an initial design, but no good videogame goes from initial design to release. I don't think anyone really saw the crash coming. There wasn't a sense of impending doom, nobody expected things to reverse as quickly as they did. People had incredible denial over the idea that there *was* a crash. And the only thing Atari knew to do at this point was to sell 2600 games; that was their only money vehicle."

However great Atari's liability was, events outwith the firm's control were equally responsible for the decline of the 2600 games market. Rex Bradford reflects on how third-party 2600 development self-destructed in 1983. "If I'm remembering correctly, January of 1983 was when things started to go completely haywire. We were going to consumer electronics shows, and there were so many third-party companies with games. It was *Custer's Revenge* – all these crazy games. It was insane. Later, some of us left Parker to join ▶



THE CODER / DESIGNER

Developer Howard Scott Warshaw remembers the 2600

What was your earliest encounter with the 2600?
Well I first came to the 2600 when I started working at Atari. I hadn't really been getting into videogames that much at that point. When I saw the 2600, and started to see the games, I just thought: 'This is kinda cool!' I was a huge fan of television, and I just thought this was a great thing to do with television.

Why do you think that early 2600 titles weren't more original?
Quite simply, creativity is a tough thing. There's also a fundamental rule that the first thing anyone does in any new medium is recreate everything that's been done in past media. Prior home games were ridiculously elemental, but arcade games had variety and potential, and so it made sense to recreate those. Also, it was a prior identification thing and became almost the dominant mode of marketing.

How did you feel when you moved on from the 2600?
When Atari fell apart, there wasn't another place to go to do the 2600. Also, I was kinda burnt out. My experience at Atari was so intense, so remarkable, that I really needed some rest. I knew that was the end of a way of being that was absolutely life changing and so profoundly positive, validating and indulgent – and that was a loss.

How did developing games for the 2600 and other consoles actually compare?
I was still on the 2600 when things died at Atari. At the next gaming company I did, we were doing games on the PlayStation and PS2. The 2600 was one of the last platforms where you had an individual developer, and that's one of the biggest differences. But it just got bigger and bigger as the consoles got later and later – so those became collaborative works.

Why was the 2600 commercially viable for so long?
The decade after its release, the mass market had left the 2600, but 2600s were still there. The game prices had dropped substantially, but there was still a market. By the late Eighties, there weren't many systems you could make a game on yourself. For most systems, you needed a team and a tremendous amount of money to make a game. So the economics of the 2600 still worked.

CLASSICS

SEGA

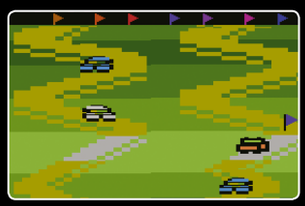
The coin-op giant that brought arcade hits to the 2600

SPY HUNTER

■ Developed in the US by Sega Electronics, the 2600 *Spy Hunter* nails the coin-op's speed and gameplay while making very few concessions. Jeff Lorenz's adaptation of Midway's top-down vehicle shooter squeezes in the original's main road and river sections, its hostile vehicles – including the helicopter – plus the oil slick, smoke screen and missile power-ups. These are triggered by the second controller's fire button, but given the game's overall quality this is a tolerable workaround.

UP'N DOWN

■ Although hardly an arcade sensation, Sega's isometric obstacle course racer received quite a few conversions. The game's objective is to steer a VW Beetle through a maze of intersecting roads, collecting flags and either leaping over or onto obstructive traffic. Sega outsourced the 2600 version to US developer Steve Beck, and although Steve's port doesn't accurately replicate the arcade title's high-res multicoloured visuals, it captures its bump-and-jump design nicely.



TAPPER

■ A by-product of Sega's distribution relationship with Midway, the 2600 conversion of *Tapper* was ably developed by Steve Beck. As with Steve's 2600 *Up'n Down*, 2600 *Tapper* faithfully translates the mechanics of its arcade counterpart, but unlike *Up'n Down*, Steve's *Tapper* has nicely rendered high-resolution graphics. More impressively, sliding pints down its bars to customers is as compelling a prospect as it is in the coin-op, and the 2600 port reproduces four of the arcade game's five levels.

THUNDERGROUND

■ Technically a 2600 exclusive, except Jeff Lorenz's *Thunderground* is pretty much a conversion of the second stage of Sega's coin-op *Borderline*. Besides concessions to the top-down arcade game's visuals, *Thunderground* also swaps the original's enemy jeeps for tanks, but in gameplay terms it plays almost identically to *Borderline*'s level two. Besides blasting tanks and digging through terrain *Dig Dug*-style, the game's tricky core objective is to destroy six nuclear bases per stage.

» *River Raid*'s success on the 2600 led to it being ported to many other systems.

▶ Activision. And so in 1983, I was working on a game called *Kabobber*. That was how I experienced the crash. Activision at that time had about 60 titles in development. The word came down that they were going to publish only, like, five of them because of the market. Mine didn't make the cut. It did seem like an unexpectedly swift decline; one year was white-hot, then the next year the whole thing was in collapse. There were a lot of factors for the decline – including the flood of lousy games, but part of the story is that people really did peak out what you could do with the 2600 by 1983. The games were also expensive."

On the collapse of the 2600 games sector – and the US console market as a whole – David Crane traces events back to the formation of Activision, the firm's success as a third-party developer and the fate of those that followed its lead. "By showing that there was a viable third-party videogame business, Activision – and later Imagic – helped to cause the videogame crash. We had trade shows – CES – every six months. In one six-month period, 30 new companies showed up trying to follow in Activision's footsteps. Each got a couple of million dollars of VC money, and they designed and built game cartridges. Those companies all failed, and flooded the market with games at bankruptcy, fire-sale prices. That Christmas, over 20 million game cartridges were in bargain bins at the front of toy stores. Dad, bringing $40 in to buy his kid the latest Activision or Atari game on his Christmas list, stopped at the bargain bin and bought eight games at $5 each rather than the new game his kid asked for. Not until all 20 million bargain games sold through would new, high-quality games sell. That put a lot of companies out of business, causing the shutdown of Imagic and almost destroying Activision."

Following the fall of the 2600, Atari itself entered a downward spiral. In early-1983, a newly appointed CEO cut the firm's staff by 80 per cent, and then in 1984, Atari was sold to Commodore founder Jack Tramiel, who reduced Atari's employee count by a further 90 per cent. Jack's intension was to create a 16-bit computer, but he needed funds, and so in late-1985, he hired Mike Katz to market an inexpensive, cost-reduced 2600. "Jack Tramiel had bought Atari for debt from Warner," Mike recollects, "and he approached me to try to resurrect it. Our opportunity for the 2600 was to come out with as low a price version as possible, with the least expensive software. We had a very good commercial, which had the jingle, 'Under $50.' Everything we did in marketing was intended to be not extravagant, but fit the bill of creating awareness that Atari was back."

> **"Many people claim that 2600 games are still more fun to play than any modern game"**
> David Crane

By early 1986, however, the gaming landscape had changed dramatically from the 2600's 1982 peak, which made it challenging for Mike to facilitate in-house and third-party games for the system. "It was difficult to get any new developers to develop for the 2600 because they wanted to make money and the capabilities of the machine were limited. We couldn't get the conversion rights for the hot coin-op games because Nintendo had a lock on through their relationships with the Japanese coin-op manufacturers. So these were problems, but I'd just come from the computer game company Epyx, and it occurred to me that the awareness that arcade games had generated in the past for home systems might be gotten by going after the bestselling computer games. So I went to people I knew from the industry to see if we could get them to do titles for the 2600 based on computer games. I thought it was a good strategy, but Jack was not willing to put money behind our own development nor was he willing to put it behind marketing."

However, by 1987, Mike's strategy was paying dividends. Tod Frye was working for Epyx at the time, and remembers the thinking behind porting computer classics, such as *Summer Games,* to the 2600. "Epyx had these Commodore 64 games, and was going horizontal with them out to the other platforms. At the time, the thinking was still that there were a lot of 2600 machines in people's living rooms. While technology had moved ahead, we knew a lot more programming tricks for the 2600, so you could actually make a pretty good game without banging your head against the wall."

By publishing titles on the Atari label and encouraging third-party development, Mike Katz managed to buoy the 2600 games market throughout 1988. By the following year, however, Atari was all but alone in developing for the system. Tod Frye found himself employed by Atari founder Nolan Bushnell's firm Axlon in 1989, and he explains how Nolan struck a deal to design 2600 games for Atari. "Atari still had some not-insignificant number of 2600 units, and basically Nolan said: 'We've got great ideas, and they will breathe enough life into the 2600 market to flush the last few million units out of the warehouse.' I think Nolan just needed a job, but he did actually have the chops to put together this package of game concepts that Jack Tramiel would buy for the 2600 in 1989."

Atari's last 2600 games trickled out in 1990, and the system's final commercial release appeared in 1992. Looking back, Tod Frye credits the console's long lifespan to its constantly evolving games. "I think the 2600 lasted so long because the games kept getting better, because the designers and the programmers kept being able to eke more out of it."

Commenting on the contemporary 2600 homebrew scene, Howard Scott Warshaw identifies the system's challenging architecture as its ongoing attraction. "People are still making 2600 games. Their games aren't really commercially viable; they're not making a shitload of money with them, but it's about the challenge. There is something really kind of magical about meeting that challenge."

Given the final word on Atari's popular, pioneering console, David Crane singles out the sheer creativity and inventiveness of 2600 coders and the fun provided by their games. "Many people claim that 2600 games are still more fun to play than any modern game. If true, that is due to versatile hardware and creative game designers. The 2600 both pioneered and embodied that wondrous time in history." *

Thanks to Larry Kaplan, David Crane, Warren Robinett, Rex Bradford, Howard Scott Warshaw, Tod Frye, Mike Katz and Alan Murphy.

THE ATARI GAMES BOSS

Ex-Atari Games boss Mike Katz on the 2600's revival

What was your earliest encounter with the 2600, and what are your earliest memories of the system?
The 2600 was a phenomenal success. I was in Mattel from 1975 to 1979 working in new product categories, and I was always impressed when a new product came out that filled a need or was something totally new. I thought a home videogame system that allowed you to play arcade hits – more modestly – was a great idea. So my hat was off to Nolan Bushnell and Atari.

What attracted you to running Atari's videogames division?
I liked turnarounds. We started the handhelds at Mattel, which led to the Intellivision. Coleco was almost bankrupt and succeeded [partly] thanks to ColecoVision. I was hired by Epyx, and we made it profitable, but I wanted to get back into hardware. So I was approached by Jack Tramiel. He wanted to rejuvenate the 2600 and the 7800, and he asked if I'd run Atari's videogames division.

How did you make the 2600 competitive against the NES?
There were people who couldn't afford $120 for a games system and $29 for software – that's what the price of Nintendo was. So we reduced the cost and size of the 2600 and introduced it at $49.95 with cartridges under $15. It provided a lot of sales and profits. But everything for Jack was strictly low budget, so we had to be extremely imaginative – we even shot our own commercials on videotape.

Why was the 'Atari Software Development Group' set up?
There was a guy called Larry Siegel. Jack loved him, and he claimed that he could put together a development group and solve the problem of not having software for the 2600 and the 7800. So he got funding from Jack for an independent development group, out of Chicago, which worked on games. They didn't succeed, but they were trying, I guess.

What would you attribute the 2600's long-term popularity to?
It had the hot arcade games of the times – *Pac-Man*, especially. And it was inexpensive compared to the newer games systems that came out. In the last five to ten years, whoever has the rights has reintroduced them at a low of $19.95 with games built in. It's all about nostalgia, and it's about being able to pay very little for a lot of fun and enjoyment.

» Larry Miller's *Enduro* is seen as one of, if not *the* best, racers on the 2600.

EDITOR'S CHOICE Night Stalker

This is amongst the most highly regarded of the Intellivision originals, and it's easy to see why. *Night Stalker* casts you as a man trapped in a deadly labyrinth filled with bats, spiders and deadly robots, with the goal of amassing as many points as possible by shooting these enemies. It's not an easy task, though – you're not armed to begin with and each gun you collect only holds six shots, so you frequently flip roles, playing both hunter and hunted. It's simple, but tension increases greatly as the game progresses thanks to the introduction of smarter and tougher robots.

Intellivision

» **MANUFACTURER:** Mattel Electronics » **YEAR:** 1979 » **COST:** £199 (launch), £25+ (today)

When the toy giant Mattel decided to investigate the possibility for a home videogames console in 1977, it was looking at new ground that nevertheless had a big flag already planted on it. The arcade colossus Atari was getting ready to launch its 2600 console, and although Mattel had identified a suitable product from General Instruments (the Gimini 6900) that it could base its own console on, the company decided that it would instead focus on handheld games. These sold well and established the Mattel Electronics brand, to the point that by 1979 the company had mustered the will to take on Atari. A team of engineers headed by Dave Chandler then worked to build the final Intellivision hardware for a test launch later that year.

The console itself would fit into any late Seventies living room thanks to its mixture of gold and woodgrain panels. The gold carries over to the two built-in controllers, each of which includes a directional disc and number pad, with a slot for game-specific overlays. This classic design would be abandoned in favour of the significantly uglier Intellivision II prior to the videogame market crash in 1983, but later formed the basis of INTV Corporation's INTV System III. *

Intellivision Fact

■ Although it's still a digital controller, the directional disc on the Intellivision controller recognises 16 distinct directions – twice as many as a regular joystick.

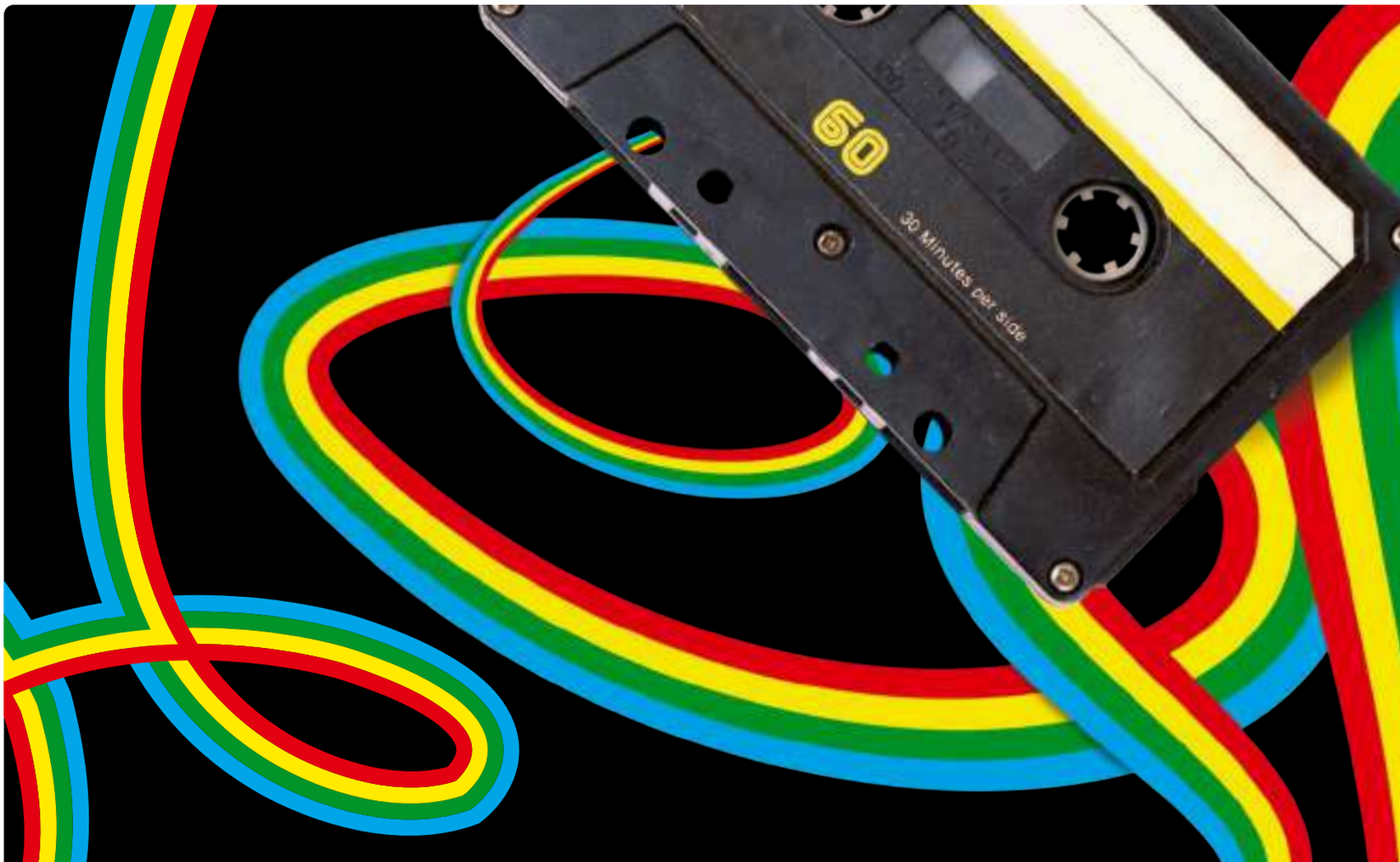
RAM: 524B MAIN MEMORY, 932B GRAPHICS MEMORY

PROCESSOR: GENERAL INSTRUMENTS CP1610 16-BIT CPU (894.886 KHZ)

GRAPHICS: STANDARD TELEVISION INTERFACE CHIP (GENERAL INSTRUMENTS AY-3-8900-1)

AUDIO: GENERAL INSTRUMENTS AY-3-8914 (THREE-CHANNEL MONO)

MEDIA: ROM CARTRIDGE



Celebrating the ZX Spectrum

Few 8-bit systems are as iconic as the humble Spectrum. Graeme Mason looks at the machine after its release in 1983 and asks what made the Speccy so popular with developers, publishers and the public alike

It's September 1983. A young man stares wide-eyed from behind the counter of his computer shop on Bradford Street, Walsall. The man's name is Steven Wilcox, and he will soon have a big role to play in the 8-bit computer game market; for now, however, Steve is excitedly trying to calculate how many ZX Spectrums he can sell in one day.

"Whenever I hear these days of consoles such as the Wii being in huge demand and selling out," he says today, "I'm always reminded of the Spectrum and the frenzy there was about it." Somehow, the future founder of renowned publisher Elite Systems had managed to secure a large stock of the immensely popular computer for the Christmas period of 1983. Word had escaped and families were travelling from miles away just to get their hands on one of the iconic micros. Steve's younger brother, Richard, was in the shop as normal, experimenting with the computers and games.

"For me, as someone who had been into computer gaming for some years," he says, "it was like a validation. It was the beginning of gaming becoming mainstream." The Spectrum, released in April 1982, was still causing a sensation over a year later.

On the frontline

This is one of many stories from the ZX Spectrum's early days at the frontline. 165 miles further north, in Stockton-on-Tees, was Ian Richardson, who would go on to work for well-known software houses such as Ocean and Gremlin Graphics, and he tells a similar tale: "It really felt that Sinclair drip-fed the market, plus there weren't many places stocking them at the time, other than WHSmith and Dixons." Ian worked in his father's shop, TopSoft Computers. "My dad was interested in starting a retail business, and my love of computers – and especially gaming – persuaded him to open a computer shop. I explained carefully to him that it was not easy getting software in our hometown, as you were restricted to places such as Smiths and Woolworths.

Sinclair Research designer Rick Dickinson, responsible for the look and feel of the Spectrum, remembers the situation clearly: "There was a Spectrum frenzy. Stores sold out quickly, with queues of people appearing whenever there was news of fresh stock." The computer's popularity took Sinclair aback. "We were surprised, as it exceeded our highest expectations in terms of demand," continues Rick, "and despite our factories theoretically being able to meet demand, it was more a question of the supply chain and how quickly stock could be replenished." It was a popular rumour within Sinclair that during these early days, there were at least three lorries laden with Spectrums on the road at any one time, and a reported 12,000 units sold in each week of 1983.

Also working in sales early in the Spectrum's life was Gary Bracey, future software development manager for Ocean. "I started a computer games retail business in Liverpool, basically because of the ZX Spectrum," says Gary. "Although I had previously experienced the ZX81 and Acorn Atom, the Spectrum was really the one that brought these machines into the mainstream."

Future Ocean colleague, artist Mark Jones, was also captivated by the computer, although frustratingly for him, as with many others, the machine lay tantalisingly out of reach. "I was one of the last of my friends to get a Spectrum," he recalls with an air of mock sadness, "until one day I came home from school and my mother motioned me towards a box in the living room: there was a brand new 48K Spectrum!" Despite his excitement, Mark quickly discovered the problem that afflicted many Spectrum owners: most homes still only had one television! "I set the Speccy up as quick as I could, as I knew I didn't have long before Dad came home," says Mark wistfully. "*Danger Mouse* and *Newsround* I could do without, but I just had to cram some time in getting to know my new toy!"

A world of colour

Others were impressed on a technical level. Sinclair Research employee-in-waiting Rupert Goodwins, having previously purchased a ZX81 kit directly from Sinclair, remembers receiving a flyer through the post for the new machine. "I devoured the leaflet for every last

» Budget specialist Mastertronic produced countless games for the Spectrum, and *Agent X* was one of its best.

scrap of information and immediately started pestering my parents," says Rupert. "And when it arrived – oh, the colours! I loaded up the bundled tape and was awestruck by the saturation on the solitaire card game. All the things I'd wanted from my ZX81 were there: sound, lower case, multi-statement BASIC, proper graphics, colour and a keyboard that actually moved. Technically it was both familiar yet also dramatically different." With the 16K model soon reduced in price to below £100, the ZX Spectrum was flying off the shelves.

Back at Sinclair HQ, the unfortunate demise of the QL coupled with the Spectrum's popularity caused a rapid R&D turnaround based on two of the original model's much-discussed drawbacks: the rubber keyboard and the lack of an on/off switch. With the 16K and 48K Spectrums from 1982, you had to unplug the machine to clear its memory for another program. "The latter machines seemed a logical evolution," says Rick Dickinson, "and the squarer shape was simply following the QL design to emphasise that corporate look. I remember helping with this decision, and it basically boiled down to following the QL look due to lack of time. I often wonder how it would have turned out if we'd tried for its own individual design."

In any case, the Spectrum 48K+ was the first result, which, despite the injection-moulded keyboard, reset button and more business-like appearance, was essentially the same computer again – only with a much higher faulty return rate. "I glimpsed piles of Spectrums in the back rooms of stores," continues Rick, "but I think it was just one of the risks of rapid development." With the Spectrum+ now outselling the original rubber-keyed model, support from stores for the 16K dwindled away as customers consistently sought out the extra 32K of RAM – and the new keyboard. Despite this, canny computer stores, such as Ian Richardson's TopSoft, still did good business repairing and replacing keyboard membranes on the older machines in addition to upgrading the 16K Spectrums to 48K with the aid of a kit purchased from companies such as Datel Electronics.

So Sinclair was still pressing the business angle with its machines – yet what was really making them so popular? The answer was obvious: games. For a time, it felt like every other bedroom in the UK housed a young programmer, trying desperately to emulate the early successes of the Spectrum software scene such as Sandy White's *Ant Attack* and Matthew Smith's *Manic Miner*. Software houses run from back bedrooms sprung up everywhere,

THE HOMEBREW HERO

Jonathan Cauldwell

Author of Egghead, Albatrossity, Rallybug and many more

What were your impressions of the Spectrum, from an aesthetic and technical point of view?
Jonathan Cauldwell: It took me several months of saving up in 1983 to buy a second-hand Spectrum, and when I finally purchased it I remember the colours. So bright and vivid! The screen was a riot of green, yellow, blue, red… It was amazing! It had sound tool music, explosions and little men running around. It just blew me away. On the technical side, there was a lot of negative talk about the keyboard in the magazines, but nobody really cared. We just wanted to play games!

What was it like programming on the Spectrum?
JC: It was never a lazy programmer's machine as you had to write a lot of code in order to do anything. You had to work out everything for yourself. This meant there was nothing to hide a programmer's talent or disguise their ineptitude. A Spectrum programmer is always naked.

How did you view the purchase of the Spectrum brand by Amstrad?
JC: At the time I was appalled. I had an Amstrad cassette player for saving and loading, and it was so badly constructed I had to keep returning it to be repaired. Consequently, I feared the worst, although as it happened, Amstrad ended up building the most robust Spectrums of all.

How would you explain the Spectrum's longevity?
JC: Its early success meant there were millions of Spectrums out there, and if you wanted to pick up a cheap machine to play games on there weren't many better options. Its simplicity also meant it could be cloned easily, so it remained popular in Russia and Eastern Europe, even after production of the machines stopped.

Finally, you're still producing Spectrum games today. Why do you think even now the Spectrum has such a following?
JC: It was a simple yet powerful machine. It has a vast catalogue of games with dozens more still released every year and was incredibly popular throughout the world. With the clones and official units sold, a huge number of people had one at some time or another. The Spectrum isn't likely to be forgotten in a hurry!

The Ultimate Connection

It was the most famous of Spectrum developers, and for good reason…

JETPAC

The debut of Jetman, *Jetpac* took a dash of *Joust* and added a sprinkling of platforming and a large dollop of shooting. It was the company's first game on the Spectrum and a huge hit in 1983 thanks to its superior graphics and smooth, if limited, gameplay. Ultimate's high standard of presentation already marked it out as a developer of real potential, and eight years later *Jetpac* sat alongside *Wizball*, *Uridium* and *Zarch* as one of the greatest shoot-'em-ups of all time according to multiformat mag *ACE*. An XBLA remake appeared in 2007 courtesy of Rare and included the 1983 version, which reportedly sold over 300,000 copies when originally released.

ATIC ATAC

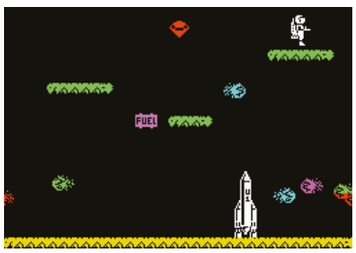
"It looked like an arcade game – but in my mate Neil's bedroom!" exclaims the former Ocean graphic artist Mark Jones, and it was impossible at the time not to be taken in by *Atic Atac*'s impressive appearance and frantic gameplay. Your job was to take charge of one of three types of warrior, each of whom had their own weapon, movement type and use of a secret passage pertaining to that character. Of course, there were lots of ghouls out to stop you escaping from the castle, although food and drink was left helpfully around to boost your warrior's strength. *Atic Atac* was a huge game for the time, boasting well over 50 screens when many titles were still single-screen affairs.

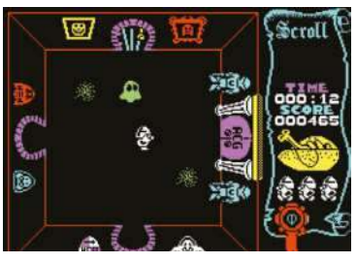
SABRE WULF

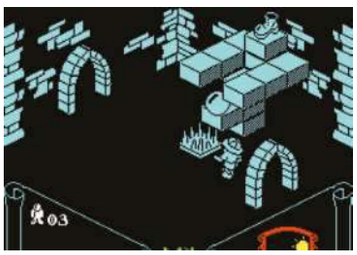
Sabre Wulf was the first outing for the iconic Ultimate character Sabreman, who would go on to appear in a further three adventures, as well as the unpublished *Mire Mare*. Following the form of *Atic Atac*, the player was stranded in a mysterious location and had to find parts of an amulet in order to escape. Even the cassette inlay set the mould for future Ultimate 'instructions', with an evocative tale of rocky glades, steep ravines and an ancient warning, yet little indication of the player's objective. Thrust into the hazardous jungle, Sabreman had to battle gorillas, snakes, scorpions and all manner of local wildlife in order to escape the labyrinthine set of 256 screens.

KNIGHT LORE

It's easy to look back now and fail to understand what all the fuss was about, but in 1984, *Knight Lore* was a revolution in graphics and game design. The Stampers took a big risk in going in this new direction – *Sabre Wulf* and *Underwurlde* had been big sellers and another 2D game in the series would still have been a surefire commercial, if not critical, hit – but it paid off spectacularly as *Knight Lore* captured the imagination of Speccy owners everywhere. Playing Sabreman again, the player this time not only had to contend with the extra dimension but also a lycanthropic curse that transformed him into a werewolf come night time…







"We were surprised, as it exceeded our highest expectations in terms of demand"

SINCLAIR DESIGNER RICK DICKINSON ON THE SPECTRUM'S INITIAL POPULARITY

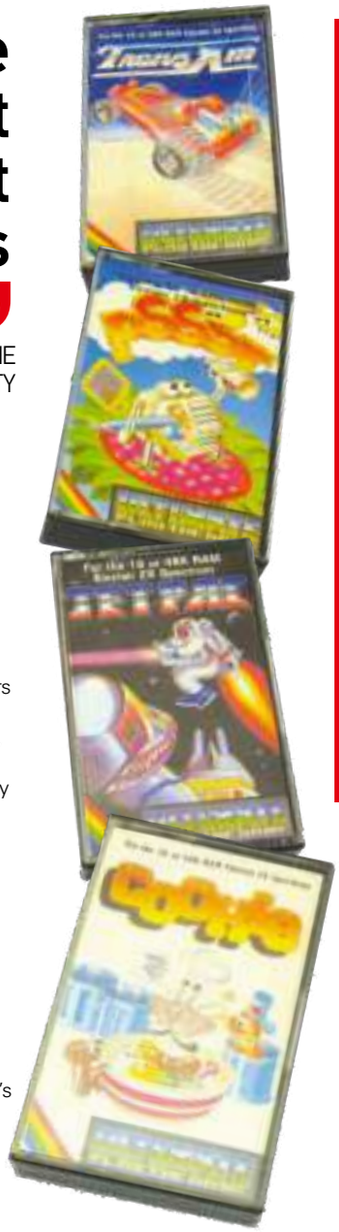
and despite many being doomed to failure, the potential of the games industry quickly became obvious to the older generation. Ian Richardson, working in his father's shop in Stockton-on-Tees, remembers one game particularly well.

"The most exciting release at the time on the Spectrum was without doubt Activision's *Ghostbusters*," he confirms with a grin. "The Commodore 64 version had been released months before and Spectrum owners were understandably desperate for their version. Back then we usually bought 20 copies of a game for its day of release; for *Ghostbusters* we had taken 150 pre-orders, which was unheard of." When the big day finally arrived, customers were soon queuing outside TopSoft Computers, waiting for the Securicor van laden with the Activision film licence. "It was a mad, crazy day," concludes Ian. "In the end we didn't get one copy on the shelves as every person that came in that day was there simply to buy *Ghostbusters* on the Spectrum."

The ultimate developer

Despite the phenomenal success of *Ghostbusters*, the software house that undoubtedly had the most consistent sales over the majority of the Spectrum's life was Ashby Computers & Graphics Ltd – more commonly known as Ultimate Play The Game. After a clutch of 16K titles that themselves became iconic, Ultimate established a line of software of such pedigree that retailers were able to continue selling them well into the late Eighties, despite a hefty price tag of £9.99 for the majority of Ultimate's output.

Ocean's Mark Jones describes his first encounter with Ultimate's famous isometric 3D engine: "I rushed round to a friend's house, who had been showing off his new purchase at school. We went upstairs and there was *Knight Lore*, already loaded, and I was totally amazed. Back then it was like controlling a cartoon."

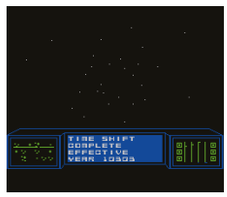


The Quicksilva connection

One of the earliest and biggest publishers for the Spectrum

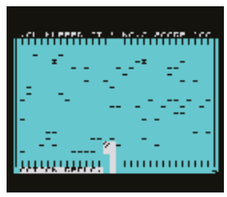
ANT ATTACK

Quicksilva was so sure that it had seen something special in *Ant Attack* that it flew creator Sandy White to its offices and had a signed contract within 24 hours. It then applied for a patent for the routines behind the remarkable 3D graphics. *Ant Attack* was a huge hit and cemented Quicksilva's reputation as one of the premier software houses of the time.



TIME GATE

This more complex shooter was a step up from the normal *Space Invaders* or *Missible Command* clones. In *Time Gate*, the player took on the role of an unnamed fighter in a classic one-man-versus-the-empire story, travelling through time and eliminating the enemy craft. A complex tracking system coupled with a fast pace make *Time Gate* an underrated classic.



MINED-OUT

Future Incentive boss Ian Andrew cut his teeth with this fine strategy title. Under the game's blank field lay several randomly placed mines, with the goal being to make your way to the other side. Clicking on a square revealed how many mines lay on the adjacent squares. *Mined-Out* was graphically simple, yet an intriguing, original and addictive game.

Philip Oliver, one half of the Oliver twins, who were responsible for some of the bestselling games on the Spectrum, emphasises the importance of the Ultimate games. "The Spectrum saw many varied and experimental games, probably more than any other computer," he says, "and games popular today are often inspired by games on the Spectrum. For example, the 3D isometric game style is still popular, and used in all sorts of games such as *FarmVille*."

This new and exciting market for computer game software, despite causing a shortage of ZX Spectrums, didn't exactly go down well at Sinclair headquarters. "I think it's fair to say Sir Clive was disappointed that the Spectrum's main market was the games industry," says designer Rick Dickinson, "but to be honest we saw this even with the ZX80 and ZX81. Sir Clive fought it for a while, but I guess eventually he just accepted it for how it was, and I don't ▶

THE MAGAZINE EDITOR

Roger Kean

Ex-editor of Crash magazine

When did you first see a Spectrum?
Roger Kean: Franco Frey brought a 16K Spectrum to Ludlow one weekend. We plugged it in, loaded up some *Defender* clone, and it knocked us out. Of course, the graphics were simple, but there was no denying the excitement of seeing interaction on your own telly rather than in the arcades.

Which Spectrum did you own personally?
RK: I never actually owned a Spectrum! First there was Franco's, and then we bought several as the magazine took shape, so it seemed pointless to own one myself.

Why do you think the Spectrum was so popular, and for so long as well?
RK: A number of factors: price, especially when compared to other platforms, and the relatively low cost of the games. I believe the quality and the imagination of the gameplay also captured owners' hearts and easily matched what was available elsewhere. Oddly, the rivalry between the Commodore 64 and Spectrum probably helped as well.

***Crash* was unashamedly all about the games. How did the reviewing system work?**
RK: Indeed it was about the games, and deliberately so. Solid, detailed and honest reviews were what the teenage market cried out for, so that's what we gave them. The reviews, effectively created by Ludlow schoolboys, became so trusted that for several years WHSmith used pre-published page proofs as a buying guide for shelf stocking. Every day between one and five lads would come in and collect the latest pre-releases that the software houses had sent us and a form to fill in. Their reactions and comments, combined with two other reviews, formed the basis for the general write-up and the overall ratings. During the first year, our first employee, Matthew Uffindell, played through the games with me and we checked the validity of the boys' opinions, and I wrote the final game review. By the end of 1984 we had a solid core of part and full-time reviewers, which made my role less relevant. Unfortunately, the increased pressures of running practically every aspect of the editorial and production meant I also no longer had much time to play the games myself.

When do you think was the best period for Spectrum games?
RK: I would put that at between late '84 and late 1986. There were good games before and after, of course, but it seemed like developers had reached a plateau of achievement thereafter. Designers in that period probably provided some of the finest gameplay ever, particularly games such as Matthew Smith's *Jet Set Willy*, Derek Brewster's *Codename MAT* and, of course, anything by Ultimate Play The Game.

As you were actively involved in the industry, did you see the beginning of the end coming for the Spectrum?
RK: It was perfectly clear to us that the buoyancy in the 8-bit market in general had a limited shelf life. However, the 16-bit machines hadn't caught the public's imagination in the same way, so we were cautious about diving in too soon. Whether we anticipated the end of the Spectrum earlier is a moot point, but our response was to launch the multiformat magazine, *The Games Machine*, as well as other magazines outside the games market. Sadly, none of these added the necessary revenue to compensate for the falling sales of the 8-bit magazines.

THE GRAPHIC ARTIST

Simon Butler
Ocean Software

When did you first encounter the Spectrum and what were your initial impressions?
Simon Butler: I saw my first Spectrum when I went to work at Denton Designs. Although I was developing graphics on the C64, it was by then my gaming machine of choice. Anyone could see the obvious advantages the C64 had from a graphics point of view, but for some reason I was a Spectrum fan from day one.

What was the first game you were involved in?
SB: That would be *The NeverEnding Story* for Ocean. Developing these graphics just felt right. Sure, it was totally different from paper and pencil, and the end result was never exactly what you saw in your head due to the character boundaries or colour limitations, but it came very easily and above all, it was fun.

In comparison to the other formats, what was it like designing graphics for the Spectrum?
SB: To be honest, it was fairly easy, but not without its drawbacks. We always knew what we could and couldn't do, so we automatically worked to the Spectrum's strengths. If I had to make a comparison, I'd say the Spectrum's graphics were like a pen and ink drawing; you would attempt to do the best you could with black and white and then, if you felt really clever, you'd throw in a bit of colour. It was good for having details, and having square pixels made things a tad easier than on the other two 8-bit machines.

suppose he minded the business it brought in." Rick empathises with the Sinclair chief: "I guess I'd be similarly disappointed that the early computers were mostly used for entertainment, but today I think we should be thrilled that so many people in the industry learned their trade on a Spectrum."

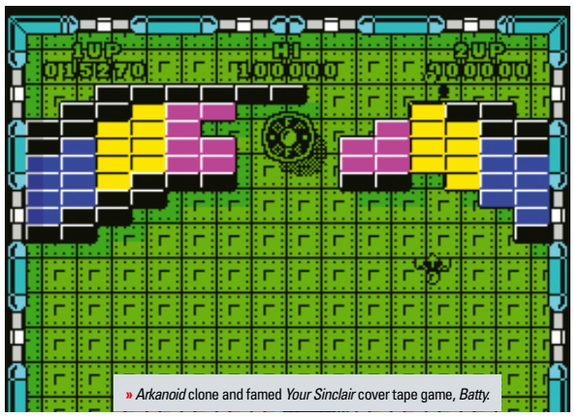
By late 1984, with the 48K models still selling well, work began on the next step up: the 128K Spectrum. Joining the Sinclair team at this point was Rupert Goodwins, who would become a key member of this machine's development team. "My first task was in March of 1985," he begins, "and it was to get the 48K source code into an editable and rebuildable state." Rupert then spent most of the remainder of 1985 working with a number of other programmers on the 128K additions such as the new sound chip and improved BASIC editor. One of his final tasks prior to the release of the machine was the onerous-sounding compatibility testing. "That was me, a joystick, a working 128K prototype, and a very large cardboard box of tapes," he grimaces. "And to be honest it burned the desire to play games right out of my system!"

128K rising

The 128K was eventually launched in the UK early in 1986 and was similar in design to the 48K+, save for the obvious addition of what would become colloquially known as the 'toast rack' – actually, an external heat sink, and not recommended in any official capacity as a means of heating bread. Despite the extra processing power and vastly improved sound, however, the success of the previous model and a lack of support from developers and software houses meant that after an initial period, sales tailed off dramatically for the new computer. "People soon realised there weren't a huge amount of games using the extra memory," says Ian Richardson. "Plus we noticed the price of the 128K (£179) was not far off the Commodore 64, which had started to become cheaper."

With the Amstrad buyout of the Sinclair brand of computers impending, the games market continued unconcerned. It was now a million-pound industry ruled by large and business-like publishers such as Ocean, Elite Systems, Electric Dreams and US Gold, each churning out more and more product every year, much of it now licensed from other media, whether it be arcade machine, movie or personality. Such was the domination and user base of the Spectrum and the other 8-bit machines that vastly superior cartridge-based systems coming from Japan such as the Sega Master System and Nintendo Entertainment System failed to make much of a dent on the UK market.

With the new Amstrad Spectrum came a greater acceptance of the machine's main appeal. Rupert Goodwins made the transition across to the Brentwood-based company. "I was impressed with



» *Arkanoid* clone and famed *Your Sinclair* cover tape game, *Batty.*

> **"The Spectrum saw many varied and experimental games, probably more than any other computer"**
>
> PHILIP OLIVER ON THE GAME DEVELOPMENT RISKS REGULARLY TAKEN ON THE SPECTRUM

Amstrad's no-nonsense approach," he says, "and a lot of things that probably should have been done at Sinclair, they just went ahead and did them."

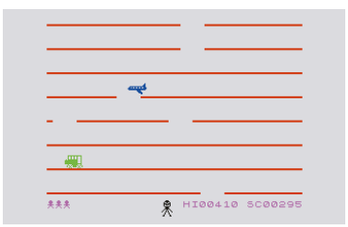
It was clear that Amstrad didn't care what its computers were used for, as long as they shifted units. To this end, the Sinclair Spectrum +2 and +3 included a built-in tape and disk drive respectively, something Sinclair Research had always appeared reluctant to provide. Rick Dickinson perhaps provides an explanation: "A lot of R&D at Sinclair went into peripheral hardware to support the games position, yet keeping everything as 'separates', and this was basically to keep the market cost down if somebody didn't want to go down that route." Nevertheless, the Amstrad machines extended the life of the Spectrum into the next decade despite

The Imagine connection

Despite its unfortunate demise, Imagine still produced several early classics for the Spectrum…

ARCADIA
Where else to begin but with the game that started it all for Imagine? Released in 1982, *Arcadia* was a lightning-paced shooter programmed by David Lawson that saw the player up against the evil Atarian empire as wave after wave of colourful enemy craft descended on the lone spaceship. The instant arcade appeal of *Arcadia* enticed many Spectrum owners and created a powerful springboard for Imagine.

JUMPING JACK
Could Albert and Stuart Ball's debut have been any simpler? It was based around a four-verse limerick, and each screen scaled would reveal two lines. Help Jack through each of the 20 screens and all four verses would be revealed. Hindering his progress were random holes and hazards that caused Jack to be temporarily stunned. *Jumping Jack* was easy to pick up, yet difficult to master.



ALCHEMIST
Famous for its attractive gold cassette edition, *Alchemist* saw the player in a battle against an evil warlock. Entering the warlock's castle, your wizard needed to collect four pieces of a magic scroll that would enable him to cast a deadly Spell of Destruction on his nemesis. *Alchemist* was a bright and enjoyable game that was streets ahead of most arcade adventures of the time.

STONKERS
Its title may be the subject of many a joke on certain Speccy forums, but this war game was one of three efforts for Imagine by John Gibson – the other two were *Molar Maul* and *Zoom* – and was actually an intelligent combination of strategy and arcade action. As commander of your forces, the job was simple: eliminate the enemy while preserving your own ammo and supply chain.

THE SOFTWARE HOUSE

Rod Cousens CBE

Formerly of Quicksilva, Electric Dreams and Activision and now CEO of Codemasters

You were working at Quicksilva at the time of the Spectrum's release. How do you recall the general feeling at this time?
Rod Cousens: The vibe in the computer industry at the time was something akin to a revolution, and the creative companies of the day – Psion, Bug-Byte, Silversoft, Salamander and us – all thought we could conquer the world. There was a tremendous camaraderie and it was a very exciting time, with young programmers working out of their bedrooms, constantly coming forward with ideas.

Do you remember when you first saw a Spectrum?
RC: I first saw one in final form at a home computer fair at the Royal Horticultural Halls in London. The main talking points were the 48K of RAM and the rubber keys! I was aware of it beforehand, however, as we [Quicksilva] had a close relationship with Sinclair, and I recall visiting Alison Maguire in Cambridge to talk about the Spectrum's development.

Electric Dreams was one of the bigger publishers on the Spectrum. How had the games market changed from the early days at Quicksilva?
RC: We were moving into support of formats such as the Commodore 64 with a broader global reach. We were also waiting for the next generation of machines and this, as with all generational shifts, resulted in rising development costs. Global publishers were entering the fray, and the first of these in Europe was Activision, and in targeting local content they funded Electric Dreams. It had become big business.

Do you remember how Spectrum sales compared to the competing formats at the time and why the games were cheaper than on the rival systems?
RC: On a global scale, the Spectrum could not match the Commodore 64. It was predominantly a European market and was ahead of Amstrad and Commodore in many European territories. As to the pricing, the cost of development was lower on the Spectrum, the catalogue of Commodore 64 games was weighted to US games, and the royalty levels were higher.

Why do you think the Spectrum was so popular and long-lasting, managing to stay in production for a decade?
RC: The design, the size and the games made it compelling at the time. And it was British. It was also a great medium of expression and was affordable.

How do you think the Spectrum has influenced what the games market has become today?
RC: The current gaming market has its roots in that era and owes its existence to that time.

production of the +3 ceasing in 1990. With the Commodore Amiga and Atari ST now firmly established, it seemed obvious, however, that the end of the Spectrum was fast approaching.

A new decade

"By 1990, the world was changing," says Gary Bracey. "The 16-bits were now dominating, and it was clear the Spectrum was on the wane and only really viable for budget software. As far as Ocean was concerned, a significant factor was probably resources: if we made a game on the Spectrum then perhaps we couldn't make an Atari ST version due to the drain on manpower. And, of course, all the best programmers wanted to be involved with the latest formats."

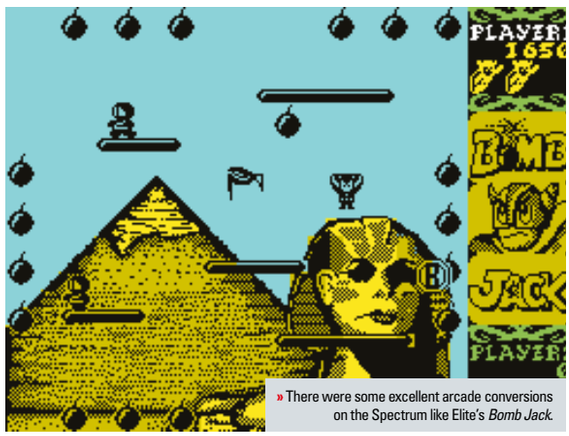
Philip Oliver also felt the tide was fully turned by 1990: "We had decided at that point to switch to console games, first to the NES and Master System, then the Mega Drive. This was mainly because of their popularity in North America and our grander ambitions for our future games. The Spectrum had done incredibly well in the UK, but not so well elsewhere."

It's an oft-discussed subject, the perceived lack of support for the Spectrum in non-UK territories, yet perhaps not as clear cut as many people assume. "The United States was always a market that attracted Sinclair, if just for the sheer scale of its economy and the potential sales," recalls Rick Dickinson. "Yet despite opening a sales office in Boston, the Spectrum was never as successful there as we hoped."

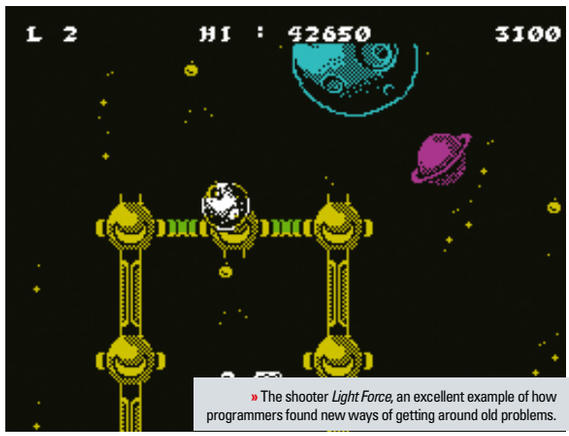
A deal had already been struck with US company Timex for distribution of the ZX81, and a similar agreement was negotiated for the Spectrum. Timex re-engineered the computer, including an effort to make the external appearance more 'American', but it ultimately faced exceptionally tough competition from local manufacturers, specifically Commodore. However, in Europe, the story was different, with countries such as the Netherlands, Spain and Germany all enjoying varying degrees of Spectrum love thanks to both Sinclair Research and Amstrad. Nonetheless, with competition from not only the aforementioned cartridge-based consoles but also the 16-bit computers, it's incredible that the Spectrum could still maintain a market share at all by this time. So what was the key to its success?

The secret to its success

"Simplicity," states Rupert Goodwins with unassuming candour. "It was simple and it was cheap. And because it was cheap, it sold heavily, and with lots of users there was a big market and a lot of wannabe programmers all teaching themselves how to write games. And because it was simple, it didn't take them long



» There were some excellent arcade conversions on the Spectrum like Elite's *Bomb Jack*.



» The shooter *Light Force*, an excellent example of how programmers found new ways of getting around old problems.

» Raffaele Cecco programmed many famous and colourful games such as *Exolon*.

» The Speccy had its share of clunkers like *Highlander*.

From the forum

Readers' remember the ZX Spectrum

Hitman_Halstep
My first experience was my brother getting one for Christmas. It was a complete eye-opener going from a *Pong* machine to watching *Manic Miner*, *Monty* or *Pitman Seven* running.

Sputryk
Saving to buy the 48+ for Christmas and buying issue 20 (*Red Moon*) of *Crash* in preparation. *Monty On The Run* was reviewed and it became my first game purchase and favourite platformer. Brilliant Christmas! Have managed to complete the game over the years, though not often as it is evil.

psj3809
I had heard about computers but only saw them in catalogues or on display in Dixons. I went round my best friend's after Christmas one day and saw he had a 16K Spectrum and loved it. I was amazed you could just keep swapping in different tapes to load in so many different games!

sirclive1
Christmas Day 1984 was the most amazing day ever. I'd had my Spectrum for a year but had really been scraping around for games, typing in listings from magazines, reading *Crash* and imagining how they all played, borrowing games off mates and having a great time but not owning many games as money was tight. I had only written 'Spectrum games' on my Christmas list, but got *The Lords Of Midnight*, *Daley Thompson's Decathlon*, the *Automania/Pyjamarama* double pack, *Booty* and *Ghostbusters*, and I don't think I moved off the Speccy all day apart from a quick break to eat my Christmas dinner! I still have all those games on a separate shelf at home. Great times.

greenberet79
My childhood = my Spectrum. Back then, games were a thing of mystery and exploration!

deadpan666
Being a bit late to the Speccy scene, I bought a lot of games pretty cheap and the magazines bumped up my collection pretty quickly. I managed to persuade four of my mates and my brother to all have a game of *Chaos* one day, and playing it as was intended with lots of real-life players was a gaming memory that will be with me always! I think it ended with loads of Gooey Blobs and Magic Fires pretty much consuming everything on the screen...

Fawltykog
Ahh, the sweet smell of burning as the mains power pack for my Speccy overheated on a blazing hot summer day in 1984. Yep, that's my most remembered memory of the wondrous ZX Spectrum... Oh, and *Sabre Wulf*, *Atic Atac*, *Manic Miner*, *Jet Set Willy*, ad nauseam.

> **"The Spectrum demystified computing"**
>
> SINCLAIR RESEARCH AND AMSTRAD'S RUPERT GOODWINS

THE PROGRAMMER

Jim Bagley

Programmer of Midnight Resistance, Cabal and Hudson Hawk for Ocean Software – and currently working on a brand new Spectrum game!

You programmed some of the most colourful games to be found on Sinclair's Spectrum. Please tell us what tricks did you use to get around its signature graphical issues such as attribue clash?

Jim Bagley: Well, take *Midnight Resistance*, for example. In order to get around the colour clash, you needed to scroll the screen in characters, 8x8 pixels. I also drew some of the sprites with attributes for maximum colour effects, like the explosions and the big bosses. It was a balancing act as well squeezing in what we could of the arcade game by removing some of the background characters that were not too different from others so we could get away with using the same characters over again! It was a juggling act of doing this without ruining the look of the game.

What were the advantages and drawbacks to programming on the Spectrum compared to other computers of the time?

JB: I loved programming on the Spectrum. So what if it didn't have hardware scrolling, sprites or a SID chip? It only made us better coders, I think, as we had to think more into what and how we would convert something. It was a challenge.

Which model of Spectrum do you have a particular affinity with?

JB: Definitely the original 48K. It's a great little machine and also was my entrance into the games industry. Its role has been a great milestone in history!

What do you think made the Spectrum so popular, both with programmers and gamers?

JB: Simple: you could play games in your own home without forking out a fortune at the arcades. And you could do so much more if you could program, or even just type in listings from magazines.

How would you explain the system's astonishing longevity, with a commercial life well into the 16-bit era and outliving many competitors?

JB: Mainly because so many people have wonderful childhood memories of playing games on it and cherish those good times. It's like a really good friend; it gave you great times and was always ready to make you happy.

to learn the ropes." Rick Dickinson adds: "I think people sensed that it could be popular and they could also see the potential for high-volume sales and profits. The low cost also made it accessible to younger people, and maybe there's just something about the Spectrum that had some kind of desirability edge over its rivals."

Ocean's Gary Bracey has similar thoughts: "The price was a great entry-level ticket for what was deemed as such a cutting-edge piece of technology, and although all the kids just wanted to play games on it, they managed to convince their parents that it was absolutely necessary for schoolwork! I think the publicity element was crucial as well. Sir Clive Sinclair was, in fact, a terrific publicist, and everyone bought into the whole 'British inventor' thing – and quite rightly too!"

Yet despite its success, the wonder that was the ZX Spectrum was not without its faults. Coming from a BBC and Amstrad CPC 664 background, the Oliver twins were late to the party. "Actually, we thought we'd missed the party completely," laughs Philip Oliver, "when, in fact, our style of mass-market, family-orientated games was just what the Spectrum audience wanted. And by 1987, there were a lot of people with Spectrums, with an estimated 3 million in the UK alone." This was clearly a major advantage in programming for the Spectrum – but what were the disadvantages?

The Ocean connection

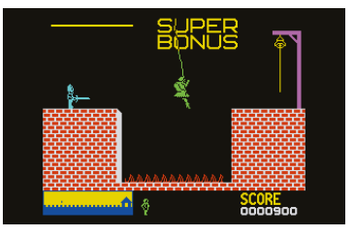
Ocean produced a few clunkers, yet many, many quality games…

ARMAGEDDON

One of Ocean's first releases following its name change from Spectrum Games Ltd, *Armageddon* followed in an already fine 8-bit tradition of shamelessly copying famous arcade games of the time and releasing them under a new name. The inspiration on this occasion was Atari's trackball classic *Missile Command*, and *Armageddon* was a decent clone released in 1983 and programmed by Adrian Sherwin. Overlook the brazen lack of originality and it's a great version.

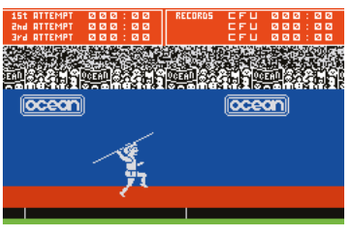
HUNCHBACK

Based on a relatively obscure Century Electronics coin-op, *Hunchback* was another early Ocean game, the sequel to which featured in the infamous *Commercial Breaks* documentary. As Quasimodo, the player's task was to rescue Esmeralda, who had been imprisoned within a heavily fortified castle stronghold. *Hunchback* wasn't the most complex of games – there were only three controls: left, right and jump – yet this lack of sophistication and its colourful graphics made it a big hit.



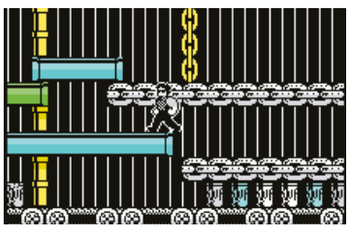
DALEY THOMPSON'S DECATHLON

The most famous of the *Track & Field* clones that peppered the Spectrum in the mid-Eighties, *Daley Thompson's Decathlon* featured the man himself – looking a little… uh… pale – charging his way through ten varied events. Programmed by Ocean veterans Paul Owens and Christian Urquhart, it became infamous as the game that ruined thousands of Spectrum keyboard membranes, making a decent joystick a necessary investment, not least for multiplayer.



COBRA

Programmed by the talented Jonathan 'Joffa' Smith (*Green Beret*, *Hypersports*), *Cobra* was a superb game based on a rather naff movie – a welcome reverse for Spectrum owners going by the usual standard of movie-licensed games. The game was immensely playable and boasted some beautifully smooth scrolling that kept it running at a furious pace. Add a dash of Smith's dark humour and some catchy tunes by Martin Galway and you have one of Ocean's finest achievements.



"The Spectrum was fairly limited in terms of speed, and the colour attributes were definitely… challenging," continues Philip, carefully. "But, in a way, hardware limitations can be a good thing as you have to be inventive and come up with clever techniques to get around them. The fact there was a good-resolution pixel-based screen meant you could get some great variety." The resolution of the Spectrum display was also a boon to graphic artists, as Ocean's Mark Jones recalls: "You could get great detail into the smallest of sprites and, as long as you knew how to work around the two colours per 8x8 block restrictions, it was possible to get a decent-looking loading screen done almost within one day."

Final thoughts

There are three elements to the Spectrum success story. First, the opening and prime period of its life; then the way this life was extended beyond what could be reasonably expected given the advances of computer technology; and finally, the Spectrum scene today, with many new games still being released every year. Its longevity in itself is quite remarkable.

"That's something of a mystery," reflects Rick Dickinson. "In the beginning I think it was a combination of the many things happening in Britain at the time, and the Spectrum just hit the right spot, at the right price at the right time. There must be something pure and special about it that people just can't leave alone today."

To Rupert Goodwins, the influence of the Spectrum on the games market today cannot be overstated. "It demystified computers and gaming," he says, "and if you were a smart kid with time on your hands you could really understand the Spectrum, right down to almost transistor level. And then, by magic, you can make money by flinging some colourful bits around the screen. Boom. You've got an instant industry."

Gary Bracey remembers the generational differences of the time. "It was the dawn of a new era, and at the time everybody was embracing this amazing technology that hadn't even been conceived when their parents were at the same age."

And from a retail point of view, Ian Richardson is crystal clear on the reason for the Spectrum's success: "The biggest advantage the Speccy had was the wide range of software available for it and that the price points on most games were so affordable. It obviously had very good support from publishers."

Spectrum forever

Richard Wilcox of Elite Systems acknowledges the influence of the Spectrum today. "There were so many different types of people making games for the Spectrum," he says, "and new gaming genres arrived on an almost weekly basis. Many of them were really embryonic and wouldn't reach fruition until many years later on more powerful machines. But just about all the staples of gameplay seen today were on the Spectrum in some form or other."

Philip Oliver agrees: "The success of our *Dizzy* games was down to the success of the Spectrum. That success has led us to create our own games studio, which today employs over 200 creative and talented developers – many of whom were inspired to join the games industry from playing games on the Spectrum in their youth."

But perhaps the biggest compliment to Sinclair and the ZX Spectrum is the way it has influenced us all, from the parents who stood wide-eyed, like Steve Wilcox in his computer shop back in 1983, as their offspring sat glued to the latest game, to those who programmed, played and wrote about the games.

"There are two kinds of people in life," muses Richard Wilcox. "Those who owned a Sinclair Spectrum and those who didn't. If you are one of the former then you've probably spent the last 30 years always feeling slightly ahead of the curve when it comes to gaming, and all because the Spectrum was the most amazing test bed for new ideas." We heartily agree with you, Richard. Here's to the next 30.

Special thanks to Martyn Carroll and all our interviewees for their time.

The Codemasters connection

Absolutely brilliant! Well, not always, but it did produce many excellent games at rock-bottom prices…

BMX SIMULATOR

Written by Tim Miller from Richard Darling's C64 original and with graphics by Codemasters regular Jim Wilson, *BMX Simulator* was the publisher's first foray into Spectrum software in 1987. It was a simple game, capitalising on a BMX craze that had passed, yet nonetheless contained clear graphics and a nifty two-player option. The famous Codemasters hyperbole was already featuring on the inlay: "AMAZING REALISM!"

SUPER ROBIN HOOD

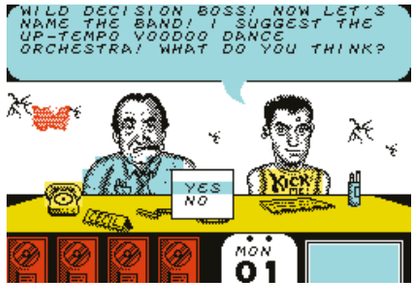
Despite decidedly lukewarm reviews at the time – *Sinclair User* rather unhelpfully called the game "useless", while *Crash* bemoaned its lack of originality – *Super Robin Hood* was a good seller thanks to some playable platform and shooting action. The high standard of presentation was no doubt a factor, as was the fact that Codemasters was offering excellent value for money with a price tag of just £1.99.

DIZZY

Released in 1987, the adventures of the little ovoid quickly became a mega-hit for Codemasters and the start of a successful career for its authors, Philip and Andrew Oliver. Somersaulting around and collecting the ingredients for a potion to kill an evil wizard was the aim of the game, and Codies surpassed itself with its back-cover exuberance: "A brilliant game by brilliant programmers for brilliant games players!"

ROCK STAR ATE MY HAMSTER

As part of the Codemasters Gold sub-label, *Rock Star Ate My Hamster* was a rock star management simulator, to use Codemasters' own vernacular, that gained a cult following thanks to its caricatures of then-current pop stars such as Morrissey and David Bowie. It was, at heart, not the most exciting of the Codemasters range, although its penchant for amusing tragedies, à la *Spinal Tap*, often raised a smile.


WILD DECISION BOSS! NOW LET'S NAME THE BAND! I SUGGEST THE UP-TEMPO VOODOO DANCE ORCHESTRA! WHAT DO YOU THINK?
YES
NO
KICK ME!
MON
01

THE FAN

Martijn van Der Heide

Owner, World of Spectrum

What were your early memories of the ZX Spectrum?
Martijn Van Der Heide: It really feels like yesterday! One of my friends got a Spectrum for his birthday in 1984 and we all gathered around while he unpacked it and loaded up the *Horizons* tape. We saw it as nothing short of a miracle: colours, sound and lower-case characters! A very memorable day.

What do you think made the computer so popular with the public?
MVDH: I believe the prospect of fortune is what struck us most; reading about programmers like Matthew Smith driving around in posh cars while writing successful games showed something of remarkable promise to us. And the games themselves were very varied; everything was open and all manner of genres were explored. Even games that failed could spawn other games of a similar ilk.

You're obviously a huge fan. What do you love most about the computer and which model in particular?
MVDH: I started with the 16K version, but the 48K rubber-key Spectrum is where all my best memories are from. What I loved was the means to create your own software without hassle. I never had an assembler until I started World of Spectrum, so I learned about it through hex-editing memory – after some efforts in BASIC, of course. Another aspect was to learn more about the hardware. How it all worked was a magnificent learning episode and prompted me to get a college education in computer science.

Why do you think the Spectrum wasn't so popular outside the UK?
MVDH: Actually, I don't buy into that. For instance, the Spectrum was well supported in my country, Holland, until at least 1989. Software was available in shops, as were the magazines such as *Your Sinclair*. Any perceived lack of popularity over the C64 I regard as American revisionism!

How would you explain the Spectrum's longevity today?
MVDH: I'm not really sure, to be honest! Perhaps the interest in Eastern Europe is responsible, although the adventure and PD scene also kept it going for a number of years. Nowadays, everything retro is hot; the Spectrum might have an advantage in that the proper tools to develop new software are freely available.

How did you feel at the end of the Spectrum's commercial life?
MVDH: I felt really sorry to see the Speccy go when its commercial span ended and the magazines closed their doors. At the time I was a student and still used Tasword Two on the Spectrum daily…

But of course it wasn't the end…
MVDH: For a moment I thought it was. But then I'd access newsgroups and found comp.sys.sinclair. That was the moment when I knew I had to keep the flag waving!

Intellivoice

» **PLATFORM:** INTELLIVISION » **RELEASED:** 1982 » **COST:** £20 (BOXED) / £10 (UNBOXED)

When Mattel Electronics announced the Intellivoice, anticipation was high. After all, speech in games was an enormous novelty – even arcade games had only been able to do voices for a couple of years. Initial reviews were positive too, thanks to the strength of early games and the unique features that speech gave them. However, the unit failed at retail and was discontinued after just a year on shelves, and plans to recoup the investment by integrating the unit into an Intellivision III console were never realised.

Why? Well, the Intellivoice module was an expensive item – $100 on launch, with no pack-in game to demonstrate the device's capabilities. Worse yet, the Intellivoice itself only contained generic phrases, so anything game-specific had to be included on the cartridge itself. This meant bigger ROM chips were required, meaning that the games that did support the add-on were also expensive. Even the popular *Tron* licence couldn't push the unit's fourth game to 100,000 sales, so existing projects such as *Magic Carousel* were shelved. In the end, just five games made it to shelves – *B-17 Bomber, Bomb Squad, Space Spartans, Tron: Solar Sailer* and the ECS-enhanced *World Series Major League Baseball.*

ESSENTIAL GAME

B-17 Bomber

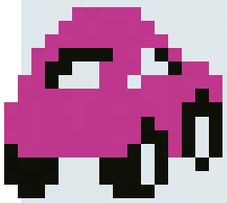
This innovative game casts you as a bomber pilot during World War II, flying out from a base in England to strike targets across continental Europe. Of course, you'll have to fend off attacks from enemy aircraft in order to carry out your mission, and this is where the voice feature comes into its own – you'll receive spoken warnings about incoming fire, approaching targets and the like. With multiple views from the plane and a variety of gauges to check, this is an impressive air combat game for its era and platform and arguably the only essential Intellivoice game.

Intellivoice Fact

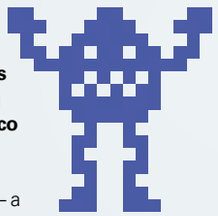
■ An international version of the Intellivoice with support for French, German and Italian speech was planned. *Space Spartans* was even translated in preparation for its launch, but the unit never made it beyond the prototype stage.

STATS

VOICE CHIP: XGENERAL INSTRUMENT SP0256
FREQUENCY RANGE: 150HZ – 5KHZ
ROM: 2KB
ON-BOARD WORDS: 36



With arcade quality graphics, great expandability and the ability to play Atari 2600 games, the ColecoVision seemingly had it all. But what was it like to work with? David Crookes finds out



Away from the searing bright lights of the Consumer Electronics Show in Las Vegas in 1982, Al Nilsen was standing in the sales meeting room of the Coleco booth, his ears resonating to the sound of an enthusiastic business pitch about a brand-new games console. As the assistant buyer for JCPenny – a huge chain of department stores – his potential backing was judged to be crucial. Yet all Coleco had to show him was a binder containing a plastic sleeve with an image of the machine and some screenshots of games it could run. In the end, it was all he really needed to see.

Back then, the videogame market in the US was worth an estimated $5 billion and there was a clamour for companies to grab a slice for themselves. Al's hunch that Coleco was on to something good was confirmed when he ventured to the firm's offices in Hartford, Connecticut for a proper look. "I saw the actual system this time and I liked it," he says. "They seemed to have done their research and they had a good offering of software." Once again, he was caught up in Coleco's enthusiasm. "They convinced us to carry it," he adds. But he wasn't alone in seeing the console's potential.

COLECO

On the face of it, the ColecoVision looked good. Bruce Popek, the former director of design at Coleco, said the company's Advanced Research And Development team "had a clear vision of where they wanted to go". Bruce's job was to produce an attractive machine which would load game cartridges from the top into the PCB and allow for accessories and expansion packs via a front port. Most of the design details were determined early on. "There were very few aesthetic models and design changes but we made an early decision to have storage for the controllers. Keeping the cords and both controllers stowed and neat helped convey the message that our gaming system was thought out, self-contained, and easy to use. It was the next step forward."

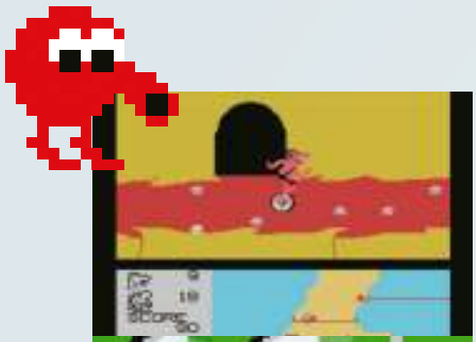
But what was it about the ColecoVision console that actually made it so special? Was it the 3.58MHz Zilog Z80A CPU, the Texas Instruments' TMS9928A video processor and the power to output at a pixel resolution of 256x192? In many respects, yes. Talk to those involved in the machine, though, and they effectively boil the ColecoVision down to two things: "Graphic superiority", as the Coleco president Arnold C Greenberg told the New York Times in 1982 (games were able to make use of 16 colours and 32 sprites on the screen at once), and lots of appealing licences.

The graphical ability of the ColecoVision was obvious to all those who saw it, not least to artist Dave Johnson who met Eric Bromley, a designer and engineer at Coleco in the hope of securing a job. He recalls being pointed towards several monitors. "He showed me a video loop of an early Smurf animation and assured me that it was a demonstration of the actual ColecoVision hardware," recalls Dave. "Once I saw that, I was convinced that there was major graphic potential."

Dave quickly came to believe that the console was in a position to faithfully convert virtually every major coin-op title, regardless of whether it was originally in raster or vector graphic form. But if the graphics were to be Coleco's gun, the company needed something to fire. Licences would be the effective bullet and the company went after them with dogged determination. "Licences made ColecoVision special," reflects Bruce Popek, the former director of design at Coleco. "Since Coleco was a toy company, it knew full well that proven licences of the top arcade games would draw sales and users from the start. We

» The excellent port of *Donkey Kong* was a huge coup for Coleco at the time of its release.

ColecoVision



had already seen the success of our tabletop arcade games with *Pac-Man*, *Galaxian* and *Frogger*."

Among the licences that Coleco managed to secure was *Donkey Kong* which ended up being included with every console. Bromley had stumbled across the arcade machine when he nipped to the loo on a visit to Nintendo in Japan. He immediately told Nintendo's president Hiroshi Yamauchi that he wanted the game for the ColecoVision which sparked some intense negotiations and ended with Coleco wiring an advance of $200,000 to Nintendo and agreeing to a $2 per unit royalty. But it proved not to be so straight-forward, as Yamauchi went back on the arrangement and decided to hand the rights to Atari instead.

Only by stressing that the power of his console would do greater justice to the look of the game than the Atari 2600 was Bromley able to persuade him to change his mind back. And that, says Bruce, was a defining moment. "It was not just a generic homespun game cartridge," he affirms. No, it was a blockbuster.

Donkey Kong was released along with 11 other games including *Smurf – Rescue In Gargamel's Castle*, *Space Panic*, *Venture*, *Lady Bug*, *Cosmic Avenger*, *Zaxxon* and *Carnival*. Deals had been struck with Sega, Exidy, Universal and, of course, Nintendo, and the graphics of these games were striking a chord with consumers. Retailing for $199.99 in the US and £149 when it went on sale in the UK in 1983, the console began to shift hundreds of thousands of units.

> **"IT HAD MORE COLOURS, A HIGHER RESOLUTION AND HARDWARE SPRITES"**
> Dave Johnson

Behind the scenes, though, there was a lot of pressure. The company had made massive investments and it leaned on the development teams to ensure the games were at their very best. "Coleco was a fiery environment, filled with many large personalities at the top and hard dedicated workers below," admits Bruce. "We were asked to do a lot in a short time and it was a very aggressive endeavour for any company of any size."

Luckily, it delivered. *Zaxxon*, for instance, wowed games in the arcades with its state-of-the-art graphics and it not only looked fantastic on the ColecoVision, it was arguably more playable too. ColecoVision soon gained a reputation for being a console which surpassed its hype. "ColecoVision was way better than Atari or Intellivision," says Dave. "It had more colours, a higher resolution and hardware sprites. That is what intrigued me and it had convinced me to take the job."

Converting those early games was no easy task, though. "We were initially designing for hardware that wasn't complete and it was very difficult to predict the final graphic output," Dave says. "We were working

ESSENTIAL GAMES

The games on the Coleco console that demanded your vision

DONKEY KONG JUNIOR

■ Turning the tables on its predecessor, *Donkey Kong*, by putting Junior on a mission to rescue his caged father from Mario, this highly-innovative arcade conversion may have had just three levels but it made up for it with colourful graphics, decent sound and some solid platform-to-vine-traversing, fruit-collecting action.

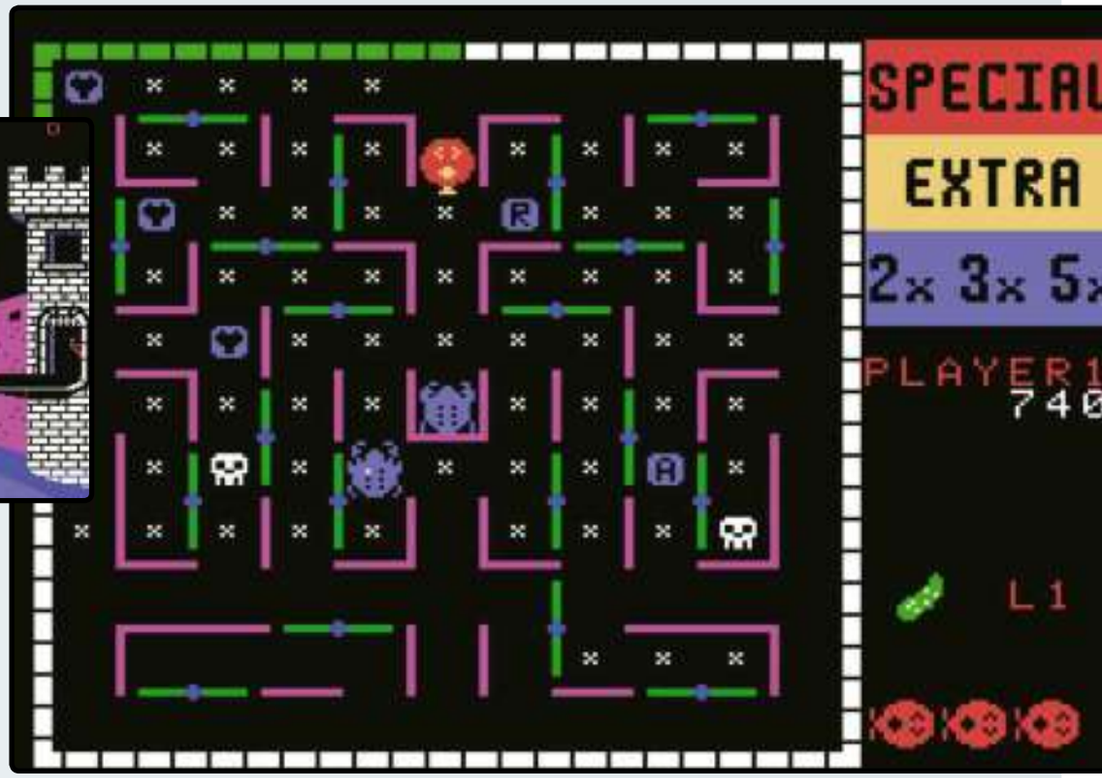
MINER 2049ER

■ Bigger doesn't always mean better yet 11 levels of platforming greatness awaited anyone playing Big Five Software's creation, and that was one more than ColecoVision's rival machines. The premise was simple – to fill each section of flooring by walking on it – but perilous jumps, time limits and enemies conspired against you.

WARGAMES

■ Inspired by the classic 1983 movie, this ColecoVision had defending the US from enemy missiles in real time. With six sectors to take into account, and a frantic battle to intercept the onslaught, it was certainly stressful - although the fast-paced action and extensive use of the controller created a classic.

» Although *DragonFire* was ported from the Atari 2600 to the ColecoVision, anyone with Expansion Module 1 could have played the original.



» *Lady Bug* was a cult favourite and its conversion was widely praised for being as good as if not better than the original.

very primitively on graph paper that was hand-coded into the system. It took a great deal of programming work to actually see something on the screen. We eventually came up with an animation interpreter and a paint system but it took years. We were too busy producing games to spend time producing tools."

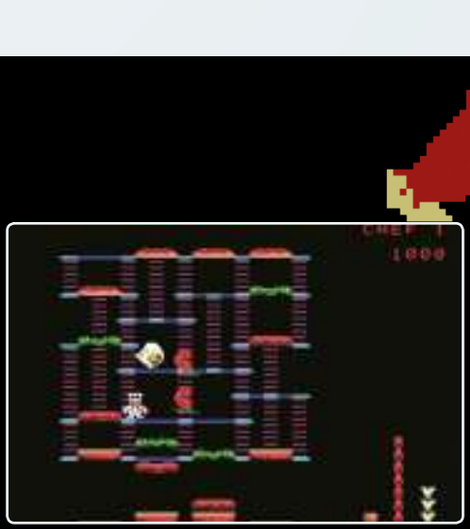
Much of the time was spent working out how the original arcade games played and recreating the graphics. "The arcade games used completely different hardware from ColecoVision: they had a different resolution, different processors and so on. Even having access to the source code would have been useless," Dave says. The in-house development team would get an arcade machine and the licence. "That was it," Dave continues. "There was no support from the original developers or manufacturers and we had to actually play the games and videotape them with a camera to zoom in and try and duplicate the game. We were basically starting from scratch as far as production goes."

The process was intense. Game designer Jennell Jaquays worked on converting *Donkey Kong* for the console (eventually becoming director of design at Coleco) and she followed the same pattern of development as she had when porting *Pac-Man* to one of the tabletop arcades: that is, to play it to death. "I have disturbing memories of playing a cocktail table version of *Pac-Man* all day because everything we did in design was based on analysis of play and documenting timing and movement patterns," she says. "I would go home to my apartment across the street from Coleco, try and read a book and see 'things' moving around in between the lines and words on the pages."

She found the most difficult task was converting 'portrait' format games like *Donkey Kong* to 'landscape' televisions. "We did what we could but it meant not being able to 100 per cent represent the original games on the screen," she adds. But the nature of creating games on an 8-bit machine brought other challenges as Debra Lazarus found when she moved from working with computer graphics on mainframe computers producing special effects for TV and film to the ColecoVision in 1983.

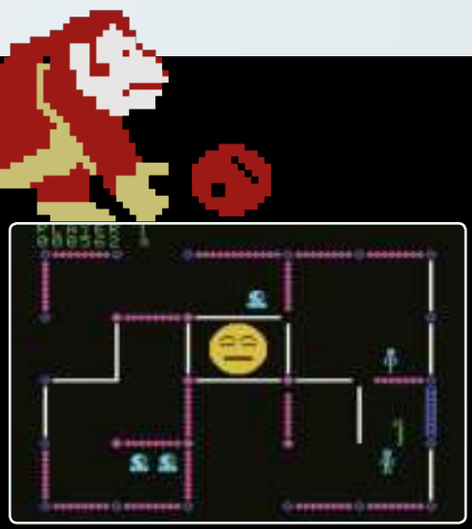
"When creating graphics for the pattern plane or sprites, there was always the imagined ideal art, but the reality was that an 8x8 pixel pattern block could only have two colours so we tried to reduce the number of pattern blocks and create shapes that could be used again to assemble graphics in the game, all to save space for speedier play and so on," she says, having worked on *Cabbage Patch Kids*, *Omega Race*, *The Dukes Of Hazzard* and *Destructor*. "The title screens would tend to have richer graphics too."

By August 1983, the ColecoVision had proven to be successful. Coleco had sold 1.4 million units and in the second quarter of that year it had earned $9.1 million which was up $7.4 million on the year before. It



BURGERTIME

■ Data East's arcade original relished the chance of turning burger-making into a game and it ported very well to Coleco's console. The delicious idea was to drop the right ingredients on top of each other and avoid Mr Hot Dog, Mr Pickle and Mr Egg, fending them off with pepper if you needed to.



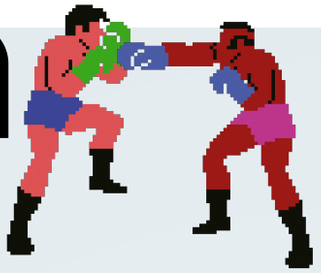
FRENZY

■ This blistering coin-op sequel to the 1980 arcade game *Berzerk* was only ported to ColecoVision and the ZX Spectrum. It showcased excellent animation and solid artificial intelligence which made shooting at enemies tough, and there were nice quirks such as blasting away at some of the walls to form an escape hole.

VENTURE

■ Released as a launch title for the console, this complex treasure-hunting arcade game took place over 12 tombs and it was a great showcase for what the machine was capable of. Despite the poor controls, it was a faithful conversion with a good array of high-pitched tunes to enjoy too.

ColecoVision



EXPANDING OUT

The ColecoVision's expansion modules made it stand out amongst its rivals

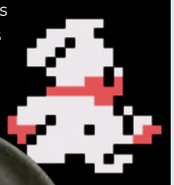
Coleco made a big play on the fact its console could be expanded straight away. "The front port for accessories and expansion packs was pretty much there from the start," says Bruce Popek, former director of design at Coleco. "It made us different." And yet, ironically, it helped make the ColecoVision into a makeshift Atari 2600 anyway.

Expansion Module 1 took advantage of the fact Atari's console used standard, off-the-shelf components. By stuffing a recreated 2600 into the sizeable module using the hardware only, the reproduction was so faithful it ran almost all of Atari's games for the machine, substantially expanding the ColecoVision's catalogue.

It had a slot where Atari cartridges could be inserted as well as the necessary switches and controller ports for 2600 compatibility. What's more Atari was powerless to stop it being sold. It tried to sue but it lost and, to make matters worse, Coleco then went on to produce a standalone, cheaper 2600 clone called the Gemini. Meanwhile, it launched the Expansion Module 2 which brought a steering wheel and pedal to the ColecoVision allowing gamers to play driving and racing titles including a port of *Turbo* which was bundled in the box. This peripheral was plugged into the controller port rather than the Expansion Module area.

The third module was also interesting. It allowed the console to be turned into Coleco's ADAM computer and it was rather comprehensive, coming with a keyboard, a memory unit and a letter-quality printer. There was even a built-in word processor although Smart BASIC needed to be loaded in by tape. Completing the set of expansions was the Roller Controller trackball which could also be used with the ADAM and came with a port of *Slither*, and the Super Action Controller Set.

The latter was a mind-boggler, since it appeared to add everything bar the kitchen sink: the new controller had a 12-button keypad, an eight-directional joystick, a speed roller and four customisable triggers on a pistol-like grip. It's almost as if Coleco was talking criticism of the original controllers to heart and figuring it would leave no stone unturned.



was the only one of the three big console makers to turn a profit. Atari and Mattel made losses. But good marketing helped. "The name of the game was games," says Alfred Kahn who led the licensing division for Coleco and marketed the console. "Getting the best possible games for the ColecoVision on an exclusive basis – at least initially – was important and there was an expectation they would be good because the ColecoVision had better graphics than its rivals."

Third-party devs were also making games for it. Big Five Software's *Miner 2049er* was converted to the system and there was a great mix of coin-op translations including *Mr. Do!* and *Frenzy* along with sporting titles including *Baseball* and *Football*. Atari peripherals could be used with the console and the Expansion Module 1 enabled the machine to play Atari 2600 games. It became an important console and even Atari saw the benefit of selling games for it.

"When I started programming the ColecoVision console at Atari in 1982, it was far more powerful than the Atari 2600 and Mattel Intellivision," says coder Jim Eisenstein. "The Atari 5200 was the only real competition in the USA in terms of graphics capability." As he found out, though, coders sometimes had to work hard to get the best out of the machine.

Jim's first game for the ColecoVision was *Galaxian*. "I was committed to reproducing the arcade game experience, making it look and feel as much like the actual arcade game and, if possible, more authentic than the 5200 version that was already out," he says. "To accomplish that, the game needed its signature flickering multicoloured star field smoothly scrolling behind an armada of multicoloured dancing and attacking space bugs. It was all done in hardware on the arcade version of *Galaxian*. Unfortunately, the ColecoVision hardware wasn't designed for anywhere near that level of visual complexity."

> **"THE ATARI 5200 WAS THE ONLY REAL COMPETITION IN THE USA"**
> Jim Eisenstein

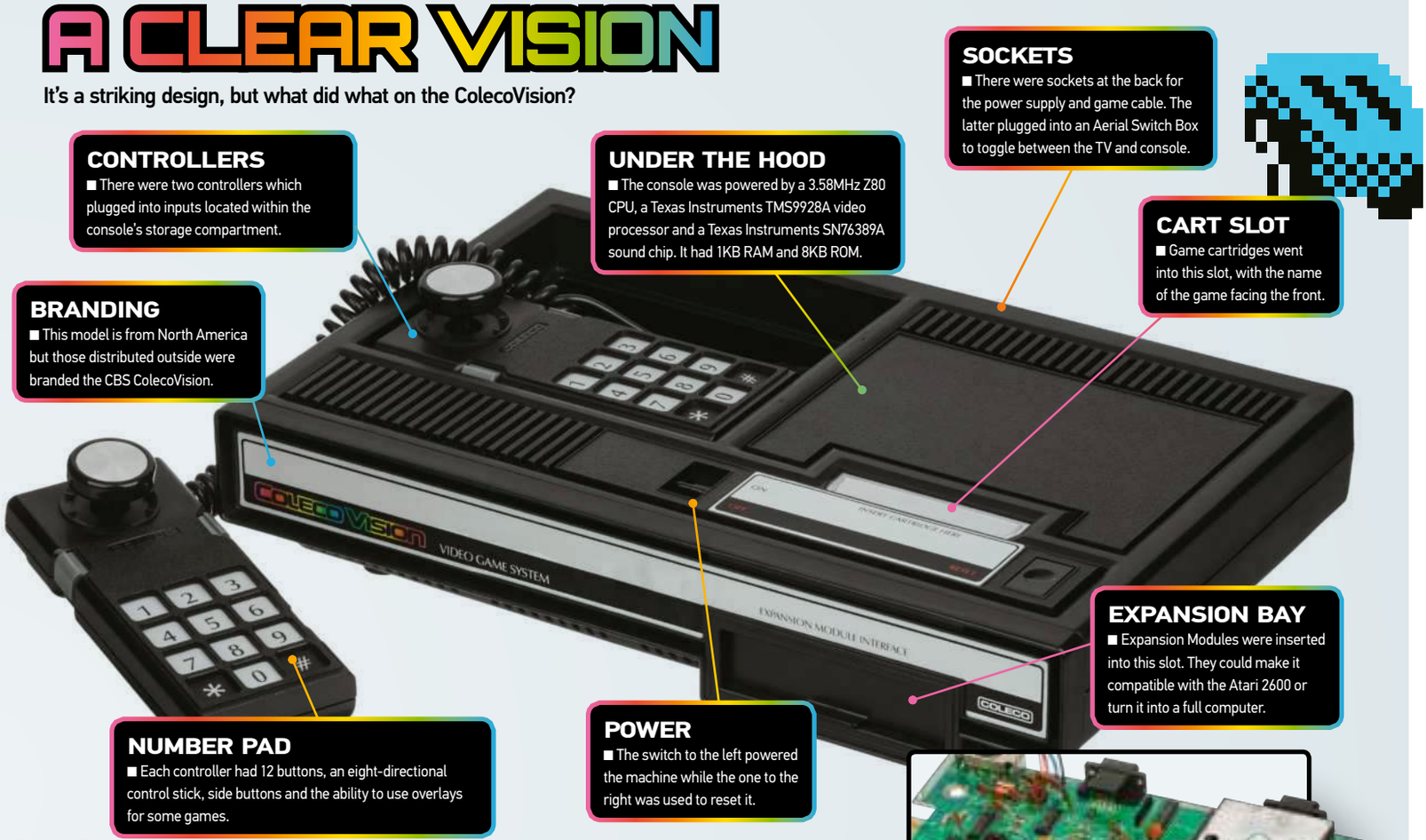
The problem was that the hardware provided a way to scroll a star field background yet there weren't nearly enough sprites to display the fully-animated space bug force in front of it. Worse, several sprites would be needed to display each multicoloured bug. Rather than make sacrifices to the game and have fewer space bugs, single-coloured bugs and a stationary background star field, Jim noted the Texas Instruments graphics chip in the ColecoVision had a unique character map mode. "It could be coerced into providing the desired outcome. There was no equivalent mode on the 5200," he says.

"By playing a lot of tricks with the graphics controller, scrolling and animating the star field background in software and compositing animated software sprites into the background with really tight assembly code that used both banks of Z80 registers to avoid memory access delays, I was able to get a flickering star background smoothly scrolling vertically behind the

» The ColecoVision version of *Zaxxon* was the first home port to make use of isometric graphics.

A CLEAR VISION

It's a striking design, but what did what on the ColecoVision?


CONTROLLERS
■ There were two controllers which plugged into inputs located within the console's storage compartment.
UNDER THE HOOD
■ The console was powered by a 3.58MHz Z80 CPU, a Texas Instruments TMS9928A video processor and a Texas Instruments SN76389A sound chip. It had 1KB RAM and 8KB ROM.
SOCKETS
■ There were sockets at the back for the power supply and game cable. The latter plugged into an Aerial Switch Box to toggle between the TV and console.
CART SLOT
■ Game cartridges went into this slot, with the name of the game facing the front.
BRANDING
■ This model is from North America but those distributed outside were branded the CBS ColecoVision.
EXPANSION BAY
■ Expansion Modules were inserted into this slot. They could make it compatible with the Atari 2600 or turn it into a full computer.
NUMBER PAD
■ Each controller had 12 buttons, an eight-directional control stick, side buttons and the ability to use overlays for some games.
POWER
■ The switch to the left powered the machine while the one to the right was used to reset it.

whole armada of space bugs dancing and attacking at 60fps." It got around the graphics chip's poor scrolling abilities.

Such efforts highlighted another problem, though. While all of these efforts were going into faithfully converting games from the arcades, there was no widespread attempt to truly push the console's capabilities. "We were never given the freedom to explore original designs," says Jennell. "The best we managed along those lines were intended to support movie or cartoon character licences which came with just as many restrictions on design. So, I don't think we pushed it as far as we could go. We were always budget-limited by the cost of ROM parts, often forcing us into lower graphics modes for some games. And the emphasis on arcade knockoffs kept us from exploring more complex types of gameplay."

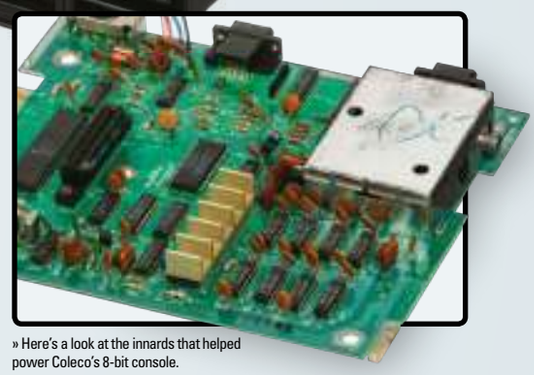
» In *Tapper*, you played a barman, but this version was one of the few arcade conversions to fall short of the original coin-op.

In that sense, some developers felt more comfortable working for other machines. "Decades later, I had the chance to sit in the audience of a panel of the Blue Sky Rangers, Mattel's videogame design team," Jennell says. "They had fewer graphics to work with, but far more freedom to explore designing games that maximized what the system could do."

Jim also bemoans the closed graphics architecture of the ColecoVision. "It wasn't designed for flexibility," he says. "I don't feel that there was much more capability to squeeze out of it." He cites *Pole Position* on the Atari 5200 as an example. "The programmer had control of each scanline on the screen and could use the same techniques Namco had used to make the track appear 3D and very fluid," Jim explains. "We were working on a version of *Pole Position* for the ColecoVision before the videogame crash of 1983 and had been unable to get an acceptable track with that graphics controller."

That videogame crash came at a bad time for Coleco. It had released an home computer called ADAM in 1983, promoting it as the best machine for word processing and games. At the same time, it launched an expansion module for the ColecoVision which turned the console into the same computer. It flopped. Bruce says it was "never available in numbers" but, to make things worse, sales of the ColecoVision were declining. In March 1984, Coleco posted a $35 million fourth quarter loss and there was talk of discontinuing the ADAM. The company pulled out of gaming in the Summer of 1985 – the same year the NES arrived.

"Our ColecoVision team was slated to begin developing for the NES as it was also Z80-based and we were the in-house experts on that system," says Jim. "The NES platform was far less impressive than Coleco's but they had Shigeru Miyamoto, the Walt Disney of videogames." In fact, Nintendo began to dominate, closely followed by Sega as a two-horse race emerged. This continued until the PlayStation arrived – a console, like ColecoVision, which seemingly came from nowhere. The Coleco dream was over.



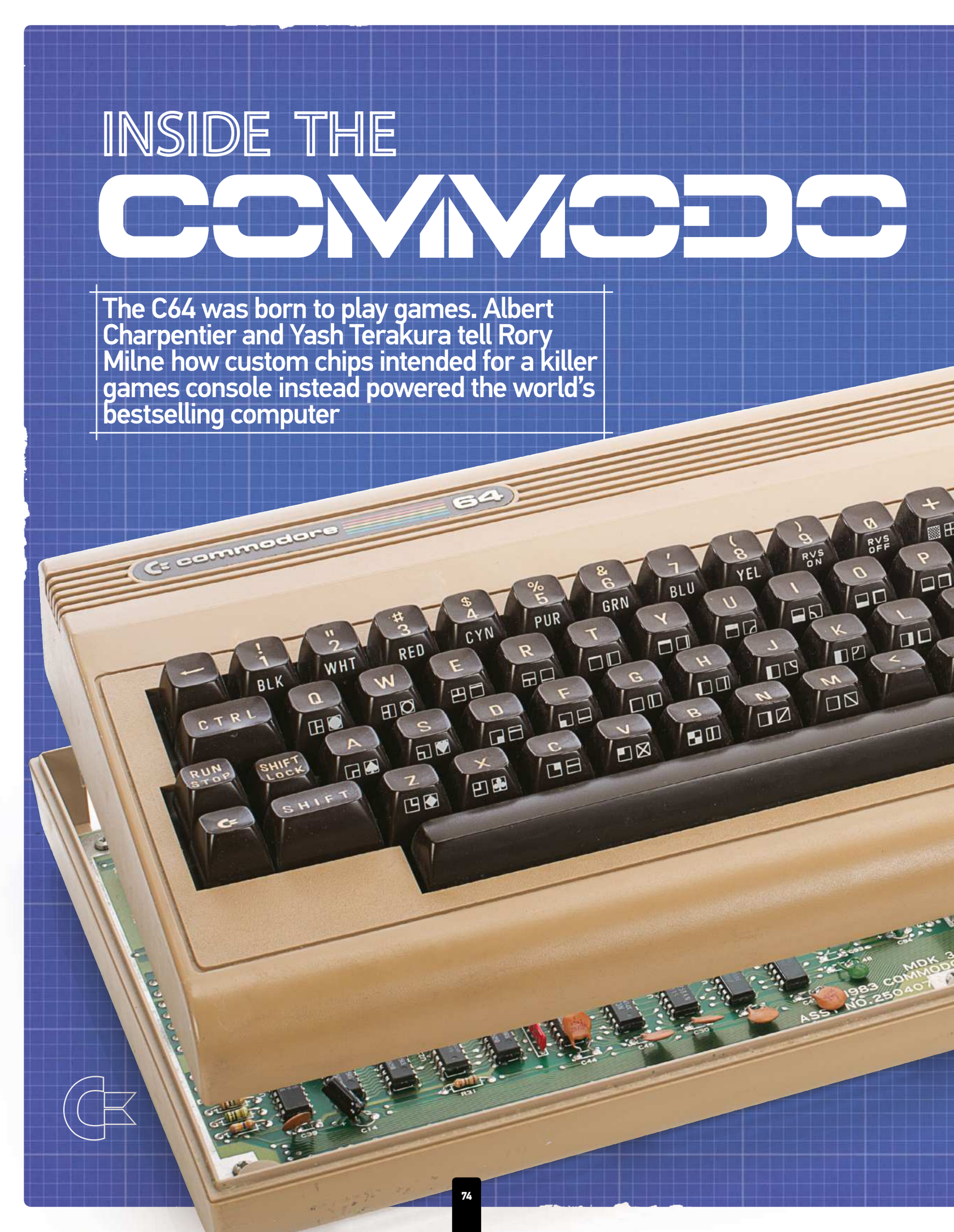
» Here's a look at the innards that helped power Coleco's 8-bit console.

Attempts were made to revive it with the Coleco Chameleon, announced on 17 December 2015. But questions over a 'prototype' emerged at the Toy Fair in 2016 and, after a huge kerfuffle, it was canned. Yet the original console still has lots of fans and a good community following (be sure to check out colecovisionzone.com), and there's also a comprehensive book on the machine called *Coleco – The Complete History* written by Antoine Clerc-Renaud.

"I feel the ColecoVision is wrongly classified as a second-generation console because in terms of power, it was closer to the NES than the Atari 2600," Antoine says. "It also set out to accomplish one goal: to bring the arcade games at home and it did so beautifully. For me, the ColecoVision will always be special."

INSIDE THE COMMODORE

The C64 was born to play games. Albert Charpentier and Yash Terakura tell Rory Milne how custom chips intended for a killer games console instead powered the world's bestselling computer



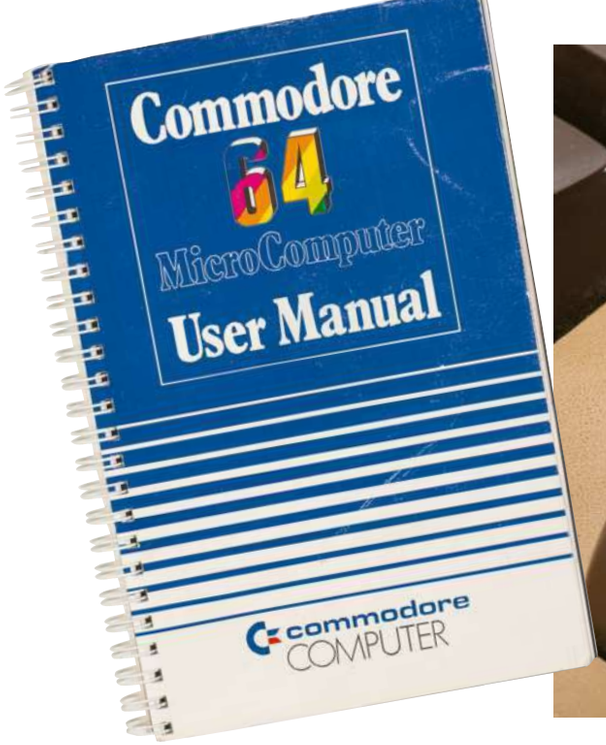
RE 64

» The controller ports on the Commodore 64 accept both joysticks and mice.

» This port allows you to place cartridges in your Commodore 64, such as the Final Cartridge III.

The story of the C64 is fundamentally one of two innovative chips created in 1981 at the Pennsylvania-based Commodore subsidiary, MOS Technology. But the system's success was secured by a third chip and a leap of faith on falling memory prices. And the machine's dominance was ensured by Commodore boss Jack Tramiel obsessing over its cost and insisting on a quality keyboard sourced through his Japanese operation.

The Commodore 64's well-received predecessor, the VIC-20, had been delivered thanks to a similar balancing of cost and quality. MOS engineering manager Albert Charpentier was responsible for designing the VIC-20's video chip, which had first been pitched to console manufacturers. Albert's plan was to have another crack at the console market with a better graphics chip. "The VIC chip was done so I started to work on the VIC-II chip," Albert begins. "The original premise of the chip was: 'Ok, the VIC was good, but it wasn't good enough to entice the game community to buy into it.' We looked at different arcade games from Taito, Konami and Atari. We looked at the features those games had so that at least we would be able to imitate arcade graphics with the VIC-II. Processors back then weren't as capable as they are today. It was a struggle to smoothly move things across the screen so that's where we put in what we called the 'sprite concept' so you could simply define the character, put in an X and Y coordinate and it would appear wherever you wanted it. So it really supported the processor so that you could smoothly move objects around the screen." ▶



» The C64's function keys are typically used for controlling a program or activating often-used routines.

> **"We put two joystick ports on for two-player games. Even though it was a computer I still wanted it to be a good games machine!"**
> Albert Charpentier

As Albert devised his custom graphics chip, MOS engineer Bob Yannes developed a complementary sound chip, the 'SID', which was inspired by synthesiser keyboards rather than computer audio chips. "Bob was really fascinated with music – his passion was audio. The VIC had some audio capability, but it was very minimal. Bob said: 'Why don't we make a full three or four voice chip that has all the fundamentals of a synthesiser keyboard?' So we essentially copied a lot of the things that were done in those keyboards; we didn't look at audio chips from our competitors," says Albert.

But Albert and Bob still needed to get the go-ahead from Jack Tramiel to develop their respective chips, which they secured with the support of Charles Winterble. "Charles Winterble was a product engineer who was hired to get a better [chip] yield, we worked pretty closely together," continues Albert. "Charlie, Bob and myself presented the VIC-II and SID concept to Jack, [we said]: 'This is the next generation.' Our pitch was a really good games console. Jack said: 'Go ahead and work with the two chips. We will see what happens.'"

Just months later, however, impressive sales of the VIC-20 saw the pair switch from games console design to home computer development. "Within six months, everyone saw it was going to be a computer. It was clear that the VIC-20 was a wonderful success – it sold, I think, close to a million units. So we said: 'Rather than doing a game console lets make this a better VIC-20.' So it would have better features. We looked at the whole memory management issue and things like that to make a more effective computer. The graphics were still a key part; it was going to be a home computer so it had to have entertainment features."

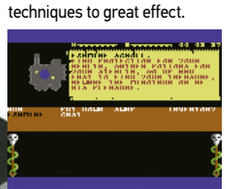
The sound chip that Bob Yannes was working on was just as important to the entertainment credentials of the VIC-20's successor – although its advanced nature was causing a few headaches. "It was the first time something like that had been done on a chip", explains Albert. "It was really hard to get filters and frequencies, and try to create a true synthesiser. It was going to be a four-voice synthesiser, but the chip was too big and we had to cut it down to three."

Thanks to Jack Tramiel's keen eye for market trends, Albert next found himself reworking a variant of the 6502 processor used in the VIC-20 so that its successor could handle more memory. "Jack would come in once a month and we'd give him a report. 64K RAM chips were just becoming available, and Jack said: 'Listen, put 64K into it. Everyone is going to be producing that RAM, it's ▶

SID MAESTROS The six musicians who made the C64 sing

ROB HUBBARD
MEMORABLE GAME:
Master Of Magic

■ At times, the arrangements of Rob Hubbard's SID compositions make them sound almost orchestral, although quite how this is possible given just three synthesiser voices to work with remains a mystery. Rob's *Master Of Magic* score spans multiple musical styles and techniques to great effect.



BEN DAGLISH
MEMORABLE GAME:
The Last Ninja

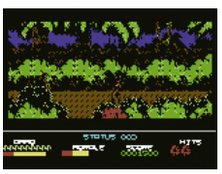
■ Preferring to freelance rather than work in-house, Ben Daglish was nothing if not prolific during his C64 days. Ben produced over a hundred SID tunes, which typically get described as 'feel-good', but his often-understated work on *The Last Ninja* proves this to be something of a generalisation.

MARTIN GALWAY
MEMORABLE GAME:
Wizball

■ Likely remembered as much for the amazing sounds he coaxed out of the SID chip as for his compositions, there's no doubting that Martin Galway made the C64 sing. Martin's *Wizball* title tune sees the C64 rock out to the synthesised strains of a weeping guitar with keyboard accompaniment.

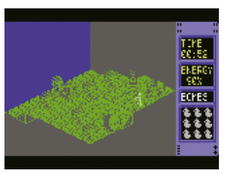
JONATHAN DUNN
MEMORABLE GAME:
Platoon

■ A late arrival to the professional SID music scene, Jonathan Dunn took over from Martin Galway when he left Ocean Software in 1987. Jonathan's first gig at Ocean was side-scroller *Platoon*, for which he created a memorably atmospheric title tune. His body of work has a distinctive, clean sound.



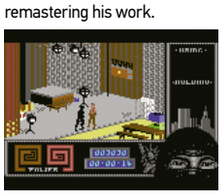
DAVE WHITTAKER
MEMORABLE GAME:
Glider Rider

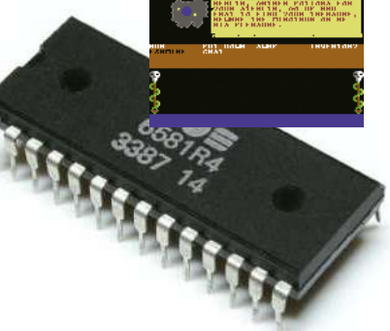
■ Perhaps the busiest of all SID musicians; Dave has gone on record to say that he has wrote tunes for over 400 C64 games. Dave's SID tunes have a uniquely 'electronic' sound reminiscent of the music that pervaded the pop charts of the Eighties and typified by his upbeat *Glider Rider* title music.



MATT GRAY
MEMORABLE GAME:
Last Ninja 2

■ Like Jonathan Dunn, Matt Gray arrived late to the SID tune party in 1987, but he made up for lost time with epic compositions for the likes of *Driller*. An exclusive contract with System 3 and arguably Matt's finest SID work followed with his *Last Ninja 2* soundtrack. Matt is working on remastering his work.



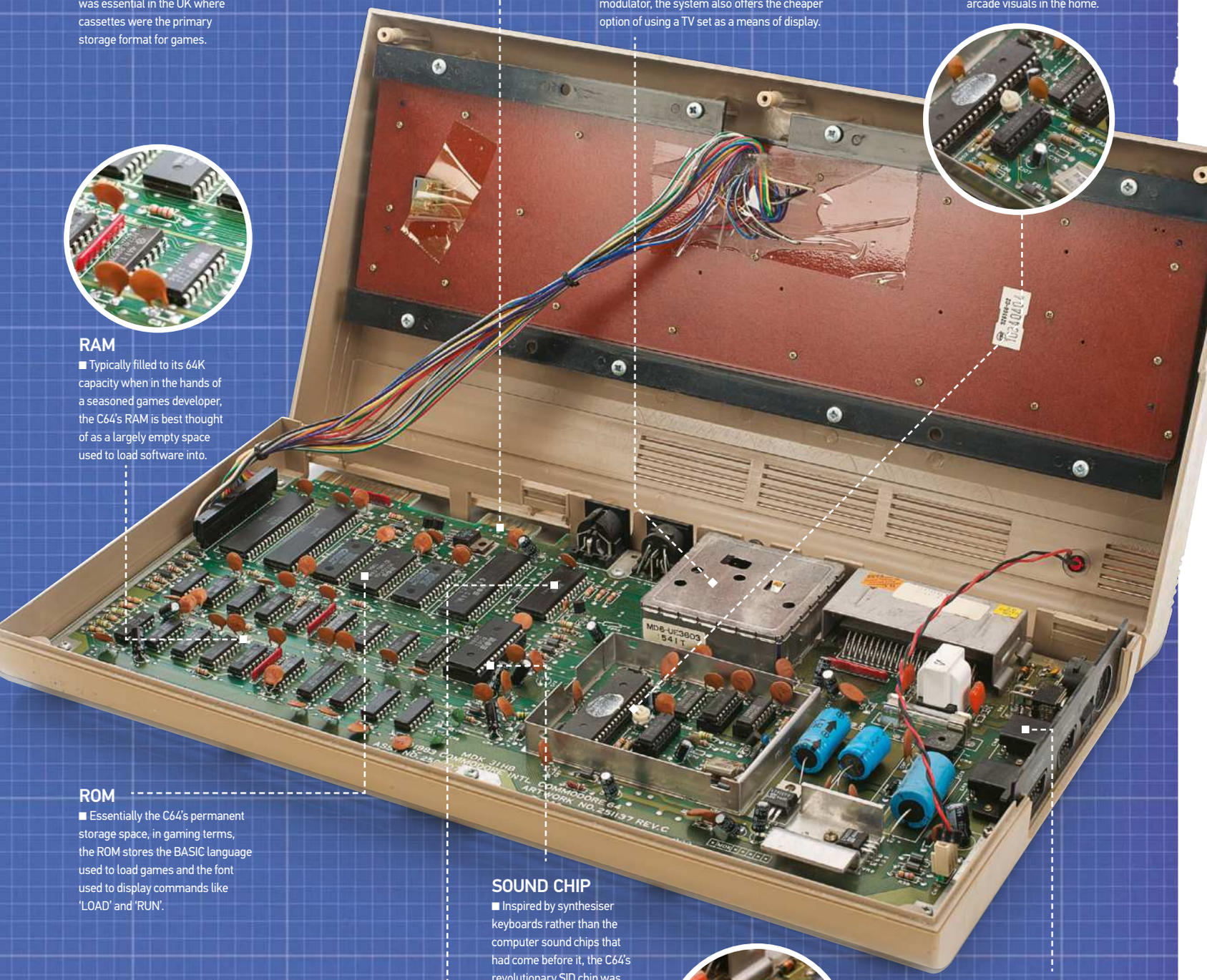


INSIDE THE COMMODORE 64 The low-down on the C64's key components

CASSETTE PORT
■ Slightly redundant in the US where the preference was for disk drives, the C64's cassette port was essential in the UK where cassettes were the primary storage format for games.

RF MODULATOR
■ Although the C64 has a video port that supports compatible monitors, thanks to its RF modulator, the system also offers the cheaper option of using a TV set as a means of display.

VIDEO CHIP
■ The multi-coloured sprites that define C64 gaming are produced and managed by the VIC-II. Albert Charpentier designed this custom graphics chip to emulate arcade visuals in the home.



RAM
■ Typically filled to its 64K capacity when in the hands of a seasoned games developer, the C64's RAM is best thought of as a largely empty space used to load software into.

ROM
■ Essentially the C64's permanent storage space, in gaming terms, the ROM stores the BASIC language used to load games and the font used to display commands like 'LOAD' and 'RUN'.

CPU
■ The 6510 CPU puts the '64' in C64. Unlike the Spectrum or BBC's CPUs, the 6510 can manage 64K of RAM by disabling access to BASIC and everything else stored in the C64's ROM.

SOUND CHIP
■ Inspired by synthesiser keyboards rather than the computer sound chips that had come before it, the C64's revolutionary SID chip was given three 'voices' by its creator Bob Yannes.

CONTROL PORTS
■ Technically for all sorts of peripherals, the C64's twin control ports were designed for two joysticks and the two-player gaming that would allow. The ports also support mice and paddles.

» Albert is currently involved in developing electronic devices for the renewable energy market.

» The AV Jack is on the left, while the serial port on the right handles devices such as printers and disk drives.

▶ going to get very cheap and it would be a great marketing position.' The 6502 could only address 64K, and that had to be ROM, RAM, video stuff and so forth. So that started the design of the 6510 where you could bank-switch pieces of memory around [to] access the hidden 32K of RAM underneath the ROM."

Of course, three custom chips and 64K of RAM don't make a computer, and so Albert started on a circuit board to accommodate these and other components. As more engineers joined the project, their prototype became known as the VIC-40. "It was the VIC-40 initially because the VIC-20 had 20 characters on the screen versus the VIC-40 which was going to have 40 characters, " Albert continues. "The VIC-II chip was done, but Bob was still working on the SID. So I started working on the PCB and getting the schematics and everything ready for that. When Bob finished up the SID he started working with Bob Russell to put together the final touches on the architecture and work up the software. Dave Ziembicki was the technician. Bob Russell basically took the VIC-20 software and remade it for the VIC-40. We put the two joystick ports on for two-player games. I loved games – so even though it was going to be a computer I still wanted it to be a good games machine!"

Good progress was being made, but a decision by Jack Tramiel in late-1981 would see Albert and his engineers working around the clock to finish the VIC-40 by the New Year. "Jack really wanted us to have something at the January CES in 1982. We worked like maniacs. The SID chip was a little bit behind schedule, but Bob Yannes was killing it and Bob Russell was trying to get the software done. Marketing did not learn about the VIC-40 until probably November. I think Jack was worried that they would get excited about this new product and not focus on selling the old stuff. I got the first silicon right before Christmas and then I found a bug in the video chip that wouldn't allow the sprites to smoothly move over the background. They had to redo the masks and run the entire chip through the process in the [chip] fab downstairs. They did that over the Christmas vacation. They got us the chip around the first of the year. We carved up a VIC-20 case to fit everything in and painted it up – it was insane!"

By the January 1982 CES, the VIC-40's name had changed and Jack Tramiel had received a demonstration of the 'C64' and approved its presentation at the show. "I think that Jack understood that if the presentation was mediocre you would never be able to win back that excitement. If the demonstration software wasn't right he would have probably pulled it from the show. I liked the name change since it distanced it from the VIC-20 – the C64 was going to be so far superior. I remember that CES very well – it was a whirlwind! We were introducing this product that we had just spent 18 months developing, and it was just fantastic. We showed two things. I remember one side of the booth was showing the C64 doing computer-like

» As you'd expect, this lights up when your Commodore 64 is turned on. Don't accidentally unplug it!

C64 COMPARISON CHART

The key stats of the C64 and its UK competition

	C64	Spectrum 48K	BBC Micro	Amstrad CPC
UK Launch Date	September 1982	April 1982	December 1981	June 1984
UK Launch Price	£350	£175	£335	£249 (with green screen monitor)
Processor	6510 @ 0.985 MHz	Z80A @ 3.5 MHz	6502 @ 2 MHz	Z80A @ 4 MHz
RAM	64 KB	48 KB	32 KB	64 KB
Display modes	320x200, 160x200	256x192	160x256, 320x200, 320x256, 480x500, 640x200, 640x256	160x200, 320x200, 640x200
Colours	16	8	8	16
Sound	3-channel synthesiser	Internal speaker	3-channel sound chip	4-channel sound chip
Keyboard	Typewriter	Membrane	Typewriter	Typewriter
Joystick Ports	2	0	2	1

» The Commodore 64's keyboard is pleasingly chunky and very sturdy. Ours still works today.

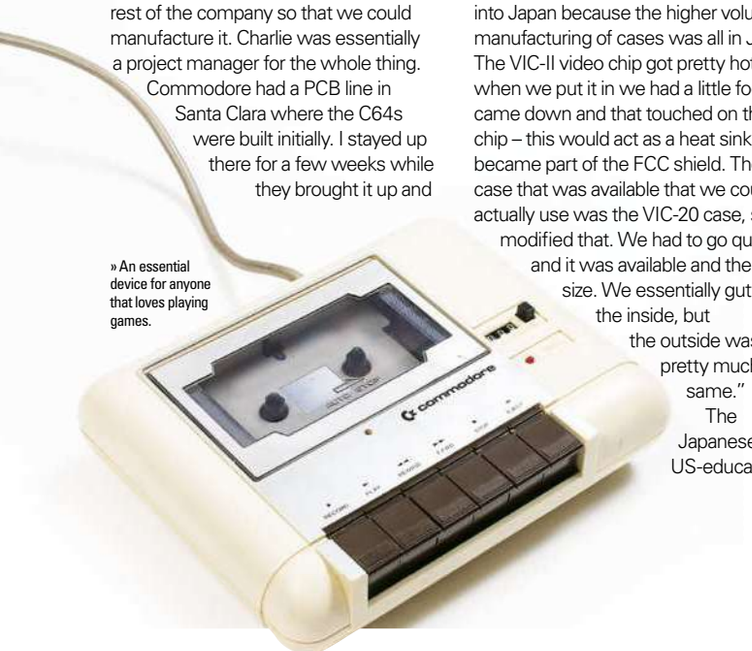
» Numerous games and applications were released for the Commodore's disk drive peripheral.

"There was a lot of pressure to get [the C64] out because clearly the VIC-20 stopped selling once people knew that it was coming"

Albert Charpentier

stuff and the other side of the booth had a couple of C64s doing games stuff. I remember that it was being described as: 'A computer that can play great games.' When Jack saw the level of excitement that's when he went: 'Ok, we're going full-board for this thing.'"

Following the CES, Albert's small team became the nucleus of an industrious company-wide effort to get the C64 into production. "Basically the team was expanded, we got a lot of help from the manufacturing team in Santa Clara. Yash Terakura was very important in that role. He was moving [the C64] out of the lab – out of the prototype – and getting it into manufacturing in Japan. Charlie Winterble was running with our designs and working with the rest of the company so that we could manufacture it. Charlie was essentially a project manager for the whole thing. Commodore had a PCB line in Santa Clara where the C64s were built initially. I stayed up there for a few weeks while they brought it up and started making it in volume. Bob Yannes was with me on that as well. Bob Russell was responsible for migrating the software from the VIC-20 over to the C64. Details all had to be worked out now that we weren't just building one of them, we had to build a million of them."



» An essential device for anyone that loves playing games.

As part of its production process, the C64 received a distinctive brown case, which Albert remembers as being the most expedient design choice. "Yash Terakura took my PC board – that went right into manufacturing. Yash was involved in putting it in the case. Yash did work at the periphery during the PCB development, but his job was mainly to get the whole thing moving into Japan because the higher volume manufacturing of cases was all in Japan. The VIC-II video chip got pretty hot, so when we put it in we had a little foot that came down and that touched on the chip – this would act as a heat sink. That became part of the FCC shield. The only case that was available that we could actually use was the VIC-20 case, so we modified that. We had to go quickly, and it was available and the right size. We essentially gutted the inside, but the outside was pretty much the same."

The Japanese-born, US-educated Yash Terakura has memories of working on the C64 in both countries – first with Albert's team and then managing production of the C64's case and keyboard in the Far East. "I moved to the US to help finish the final production model C64. I helped lay out the PCB, locate and approve parts, and do testing. I was handling all aspects of C64 engineering between the US and Japan. The housing was made based on the production PCB. The mould was the same as the VIC-20 – just with a simple colour change – and it was done in Hong Kong, but the injection was done in Japan. I did work with a design engineer in Japan, Mr. Nishimura, on details such as ventilation and the locations of the input/output ports. Mitsumi was the [keyboard] supplier; we used the [VIC-20] keyboard."

Although he didn't have a hands-on role in the production of the C64, Jack Tramiel did manage its costs and curbed Albert's desire for more expensive parts. "I remember working with [Jack]; he'd come in every two weeks or so and we'd go over the bill,"recalls Albert. "It was always a fight because I wanted to put a better quality something in. He went through every penny on that bill. He was figuring on making millions, and I remember him saying to me: 'It's a million pennies, if you don't want a million pennies I'll take [them]!'"

In keeping with Jack's cost-conscious approach was a fateful marketing decision that forced Albert to pair the C64 with an slow disk drive. "[Marketing] decided to use the VIC-20 disk drive. [There was] a whole warehouse full and they were slower than hell! Right towards the end, we were forced to put on an interface for these drives so that they could sell them off. We wanted a higher speed drive but got shot down on that one."

Albert's recollections of the final stages of the C64's production are of the pressure to get the system released and the elation that followed. "There was a lot of pressure to get it out because clearly the VIC-20 stopped selling once people knew that it was coming. But we had a lot more resources by then so it was just that everything had to come together. I think the C64 finally got into production in May [1982.] I felt wonderful! I mean, you spend a couple of years of your life bringing something together that you dreamed about that has finally reached a point of reality – and people liked it!"

When asked to look back at the C64, Yash Terakura offers a succinct and humble analysis of the system. "The design was pretty much limited to the availability of electronic parts; we had to design with what we had and we had to make it cheap. It was fun designing a computer in the old days. I can safely say that I did my best at that time."

Albert Charpentier's final words on the C64 are to give credit to the late, and great, Jack Tramiel and reflect on the millions that the system defined home computing for. "Jack Tramiel simply gave us free reign to do whatever we needed to do, and we executed. I give Jack a lot of credit; he gave us that target price, which we had to hit. It was him who had the guts to say 64K. He felt he could still hit the price point that we needed to hit, which is obviously why we were fighting over pennies every day. The C64 just took the world by storm at that price. I really feel that it introduced so many people to computers that may not otherwise have been introduced to them as quickly as they were." ✱

Thanks to Albert and Yash for telling the story of the C64.

Kempston Competition Pro

» **PLATFORM:** VARIOUS » **RELEASED:** 1983 » **COST:** £25 (LAUNCH), £10+ (TODAY, UNBOXED), £20+ (TODAY, BOXED)

It's said that imitation is the sincerest form of flattery, and if that's the case then some designers at Kempston Micro Electronics must have been very flattered indeed, as the Competition Pro joystick was one of the most frequently imitated pieces of hardware during the Eighties. The distinctive layout features a rectangular base, with a red pommel joystick protruding from a square platform. At the cable end of the base two circular, bright red fire buttons with the same function offer a comfortable experience for both left-handed and right-handed players. A standard DE9 connector ensured compatibility with the majority of systems that were on the market at the time, including Atari and Commodore computers as well as the Kempston Joystick Interface for the ZX Spectrum.

The popular design was soon copied – imitators differentiated their products from Kempston's by altering the buttons with different colours and shapes, but the basic layout was retained. Over the years, the original Competition Pro sticks would be replaced with the Competition Pro Extra series, which replaced leaf switches with microswitches. Of course, these were no longer produced by Kempston – the Competition Pro far outlived its originator, appearing on all types of accessories up until the early part of this decade. ✱

ESSENTIAL GAME Combat School

Sometimes a keyboard just doesn't do the job you want it to do, and that's often the case when it comes to button-bashing athletics games. Of course, computer versions typically substitute button presses for joystick movements, severely testing your stick's durability – and *Combat School* requires a particularly rigorous technique, so you'd need something stronger than your hand to stop the base moving as you rotated the stick. Secure it however you think is best, but please don't just shove it between your legs – we've seen enough joystick-based double entendres about games like *Track & Field* to last a lifetime.

Kempston Competition Pro Fact

■ The classic black-and-red colour scheme was eventually supplanted by a range of different casing options, including some rather nice transparent ones during the 16-bit years.

NES: INSIDE THE 8-BIT CONSOLE

When Masayuki Uemura came to the UK lin 2016 to celebrate the 30th anniversary of the NES, we sent Paul Drury to get the inside story of Nintendo's iconic first cartridge-based console from the man who designed it

Masayuki Uemura, the NES' creator, gives his head a little shake and laughs. "I thought the NES taking off was impossible," he admits. "I think Mr. Arakawa, [first president of Nintendo Of America], never thought it would either. But in the entertainment industry, the unexpected happens. I feel so grateful people still play the NES. I can't believe I'm here!"

Professor Uemura is sitting opposite us in the conference room of the National Videogame Arcade in Nottingham, speaking through his affable interpreter Akinori 'Aki' Nakamura. He has been invited by the NVA to give a talk about the creation of the Famicom, renamed the Nintendo Entertainment System or NES for its Western release, and seems genuinely surprised with the love that the console still generates three decades after it made it to our shores. The event has been sold out for weeks because though in the UK the NES itself never sold in the huge numbers it did in America, we all know what came next. Its worldwide success – 62 million units shifted puts it in the top ten of bestselling consoles of all time – led to the SNES, N64 and the Wii and first introduced us to such perennial favourites as *The Legend Of Zelda*, *Final Fantasy* and, of course, the all-conquering *Super Mario Bros.*. The NES truly announced Nintendo's arrival in the console business.

Retro Gamer has been granted a meeting with the man behind Nintendo's first cartridge-based machine before his talk later in the evening. Uemura and Aki, both dressed in smart suits, bow politely and offer us their business cards. We nod awkwardly and in lieu of a calling card of our own, we present them with some locally brewed ale, which elicits slightly bemused but appreciative smiles. The mood suitably lightened, Uemura explains that just like Ralph Baer, the father of the home ▶

© Matt Taylor

» Masayuki Uemura is the man who designed the Famicom/NES. He also created its 16-bit follow-up.

Nintendo
ENTERTAINMENT SYSTEM
NES VERSION
SELECT START
Nintendo
START
Nintendo
Official
retro GAMER
Seal of Quality

SPOT THE DIFFERENCE

The many faces of Uemura's 8-bit console

FAMICOM

■ The distinctive colour scheme of the Famicom was taken from Nintendo President Yamauchi's scarf, though Uemura says they never quite got the shade right.

■ The controllers were wired into the console to save on production costs and could be clipped into place on either side of the machine.

■ The second controller had a built-in microphone which could be used as an input device, an idea clearly ahead of its time.

NES

■ The front-loading system was designed to make the machine look like a video recorder rather than a games console.

■ The restyled controllers adopted the colour scheme and more angular look of the NES and could now be plugged in and out.

■ Cartridges were shielded once inserted to discourage children with wandering fingers getting an electric shock.

TOP LOADER

■ The remodelled NES-101 came out in 1993 as a cheap 'entry level' console and allowed cartridges to be inserted from above, hence its nickname.

■ The rounded controllers clearly used the same template as the SNES and were considerably more comfortable in the hand.

■ Its smaller size and sleeker appearance is something of a nod to design of the original Famicom, though grey still prevails.

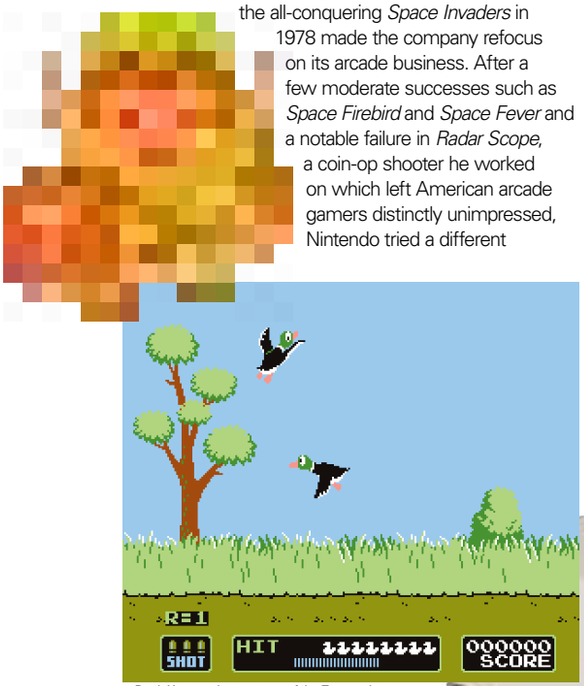
console, his background was in television technology rather than games.

"I went to Sharp as an employee before Nintendo because I wanted to develop TV hardware," he says. "The fact I knew a lot about the hardware of a TV really helped when developing videogames. TV engineering is a good background for console development!"

Of course Nintendo itself was not yet involved in the emerging world of videogames when he joined in the early Seventies. The company had a long history of producing Hanafuda cards, something Uemura credits with instilling an obsession with the quality of Nintendo's output. These playing cards were used amongst the gambling fraternity and if your product was shoddy, you risked the ire of some potentially unsavoury types. "And you could play a lot of different games with them," he adds, "like a videogame console."

The famous 'Nintendo Seal Of Quality' may indeed have its origins in the ancient cards which the business had been built upon, though by the early Seventies the company was starting to experiment with electronic toys. One of the first projects Uemura was involved with was a lightgun game and Nintendo had some success in the public arena with its Laser Clay Shooting System and *Wild Gunman*, the latter game combining this lightgun technology with a full motion videos of revolver-toting cowboys.

In the home market, 1974 saw Nintendo secure the rights to distribute the original games console, the Magnavox Odyssey, in Japan and so it was no surprise when it began releasing its own standalone TV games, which offered various flavours of *Pong* and sold in their millions in the latter half of the decade. Nintendo even produced dedicated machines such as *Breakout* clone *Block Breaker* and *Racing 112*, a generic driving game with its own steering wheel attached to the console but Uemura remembers the arrival of the all-conquering *Space Invaders* in 1978 made the company refocus on its arcade business. After a few moderate successes such as *Space Firebird* and *Space Fever* and a notable failure in *Radar Scope*, a coin-op shooter he worked on which left American arcade gamers distinctly unimpressed, Nintendo tried a different



» *Duck Hunt* made great use of the Zapper that came with the NES and it still plays well today.

» *Super Mario Bros.* was an important release for Nintendo and massively boosted sales of the system.

» Uemura has been travelling the world talking about his famous console. He remains staggered by its incredble success.

KONG STORY

If you've read David Sheff's excellent history of Nintendo, *Game Over*, you'll be aware that Nintendo initially approached Atari about distributing its console in the United States, and Uemura was one of the people tasked with showing Atari its work in progress. "They were really surprised we were making our own hardware [for a home console]," he recalls. "We had to show them the blueprint of the PCB to prove we had made it. They didn't believe it was our work! But the reason we could make such hardware is because we had made such amazing arcade hardware. That was very important. We weren't just looking at other consoles. We were thinking about *Donkey Kong*!" Indeed, it was a squabble over the rights to the home conversions of *Donkey Kong* which contributed to the deal breaking down." Does he think a partnership between Atari and Nintendo could have ever happened? "That's unimaginable now," laughs Uemura. "I wasn't in charge of making decisions like that so I can't really say." What he can say is that *Donkey Kong* remains his favourite game. Taste and technical nous, Professor Uemura...

approach. Repurposing the 'fire' button as a 'jump' function, *Donkey Kong* was a huge hit in 1981 and had a profound effect not just on Nintendo's fortunes in the coin-op world, but in its console ambitions too.

"We licensed *Donkey Kong* to Coleco for their home console and of course we needed to evaluate it," smiles Uemura. "Coleco was a toy company, like Nintendo, so we had a long history of looking at what they were doing, not just with videogames. We looked at the specifications of their hardware and what they'd done with our licensed product. They had done a very good version of *Donkey Kong*, [quite] like the arcade game. That was a surprise! It made us feel confident…"

The commendable version of *Donkey Kong* that appeared on the ColecoVision not only became the 'killer app' for that console, it suggested to Nintendo the commercial viability of producing its own machine. Uemura, who at this stage was heading up the videogame division, certainly saw the potential of a cartridge-based system and, as early as 1981, began work on designs for what would become the Famicom, though not everyone shared his optimism.

"Back then at Nintendo, no one was imagining we'd make a console with interchangeable cartridges because Game & Watch was huge," he says. "Everyone thought that was the kind of product we'd make in the future. All the engineers I had were dispatched over to that division to help them out. I couldn't do the work I wanted to do because of that."

The huge success of Nintendo's handheld series, particularly at the beginning of the Eighties when titles like *Turtle Bridge* and *Snoopy Tennis* sold over a million units, may have hindered progress on his console plans in the short term, but it gave Uemura valuable thinking space. "Because of the lack of personnel [in my division], I couldn't work, which meant I could talk to a lot of people outside of the company to find out what was going on. Of course, I talked to Atari. I could get a lot of information about console games. This research time was very precious if you think about it. I could come up with a specific idea of what I wanted to do."

Uemura leans back in his chair and starts to explain the thought processes which would determine the internal workings of his console. He wanted a CPU small enough to allow a sound chip to be integrated onto the board, thus keeping costs down, and Nintendo had a relationship with chip manufacturer Ricoh, whose 6502 processor would fit the bill. "But it was a huge problem within the company because *Donkey Kong* was made with a Z80," sighs Uemura, "so using a 6502, we couldn't use the source code. It was like throwing away a precious resource! I decided to do it anyway as chief engineer. Others said I could only do that because I wasn't programming it myself! It did mean we had to do *Donkey Kong* from scratch…"

At least Uemura considered the needs of those poor programmers tasked with converting the game to a new processor by consulting colleague Shigeru Miyamoto, the man behind *Donkey Kong*, when determining the colour palette of the Famicom. "He knew which colours would be needed to recreate his games," says Uemura, "and he would tell me how many colours the console would need [to display]. I would ask and he would answer. That was how we worked!"

With some key hardware decisions made, Uemura and Nintendo also settled on cartridges as the storage medium for the console. "We had decided its sole function was to play videogames. If it's dedicated to that, we won't need to alter data, so we chose ROM over RAM but then in 1983, the USA had a big videogame shake-up with Atari. The media thought a games-only console was out of date. There was a buzz about home computers and Apple was getting big, too. I was afraid we wouldn't get media attention so I

» *Double Dragon* uses a limited number of tiles, but careful repetition provides a nice image.

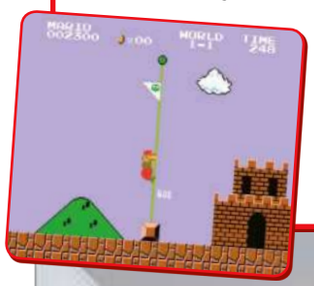
» Complex multi-sprite images in some parts of **Mega Man 2** look nice, but are prone to flickering.

FRANCHISE STARTERS

The hit game series' that started on the NES

SUPER MARIO BROS.

■ Of course he had appeared in *Donkey Kong*, albeit with a different name and profession, and Mario and Luigi had already starred in an frenetic coin-op, but this is where the brothers really showed the world what they could do. *Super Mario World* may have topped our chart of your favourite games of all time but this is where it all began.



MEGA MAN

■ Rock hard – that's the man himself and the level of difficulty typical in this long-running series which debuted in 1987. The side-scrolling run-and-gun action of the original has you leaping platforms and blasting foes with a weapon handily attached to his arm. Defeating bosses rewards you with new weapons and so the carnage continues.

LEGEND OF ZELDA

■ After Mario, Link must surely be Nintendo's best-known hero and he too began his princess-saving career on the NES. The original game was a launch title for the Famicom Disk System in 1986 before appearing in cartridge form for the NES a year later and established the action adventure template for this superlative series.

CASTLEVANIA

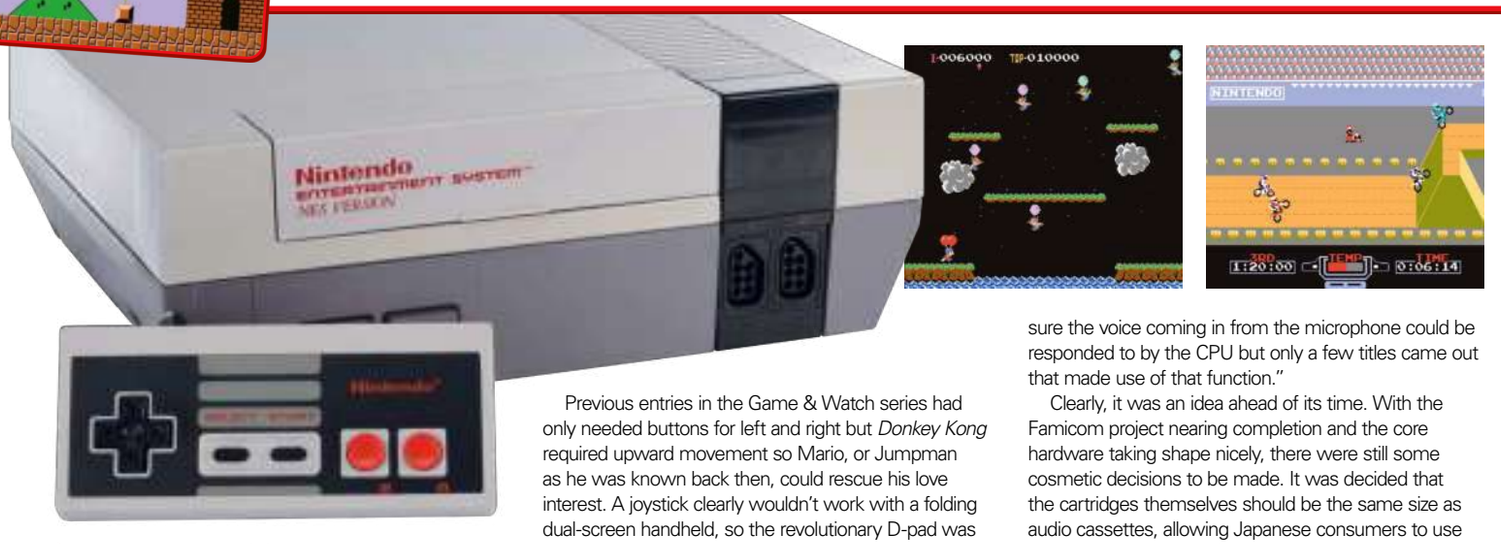
■ Another game that first appeared on the Disk System, it arrived on cartridge for the NES in 1987 and introduced Simon Belmont, vampire hunter and whip-cracker extraordinaire, to the gaming world. The first game is a solid platformer but if you're new to the series, you may want to start with *Symphony Of The Night* on the PlayStation.

FINAL FANTASY

■ With the 15th instalment due out this year, not to mention the host of spin-off titles, this may seem the most inappropriately-named franchise in gaming history but when Hironobu Sakaguchi created the original for Square in 1987, it was reputedly his last gasp attempt to have a hit game. Its success means we've been playing them ever since.

METROID

■ The series with the most famous reveal, in both senses of the word, in videogame history, began on the Disk System in 1986. Combining exploration, combat, platforming, atmospheric aesthetics and a little brainwork too, this laid the foundations for some truly excellent episodes, particularly *Super Metroid* for the SNES.



▶ explained Family BASIC was on the way [to make the Famicom] like a home computer."

Nintendo did indeed produce a keyboard and data recorder package along with its own dialect of BASIC in 1984, allowing users to tinker with its own game creations within some fairly restrictive parameters and though it hardly turned the console into a fully-fledged home computer, it did show Nintendo was prepared to experiment with new ideas.

This is perhaps best illustrated when it came to designing the controllers for the console. We have brought along a NES pad, and we hand Uemura the grey rectangle with its distinctive D-pad and bright red buttons, asking if he was responsible for designing this iconic piece of hardware. "It was the most difficult choice I had to make," he says, cradling the controller like a beloved child. "I had designed arcade games [in the past] and they used joysticks. The engineers I was working with on the Famicom said, 'We have to use a joystick!' But there was one guy who had gone over to work on the Game & Watch [team]. He came back to our project and he brought the control unit created for the multi-screen *Donkey Kong* Game & Watch to our division. He took out the screen and connected the electronics to the Famicom and we played!"

Previous entries in the Game & Watch series had only needed buttons for left and right but *Donkey Kong* required upward movement so Mario, or Jumpman as he was known back then, could rescue his love interest. A joystick clearly wouldn't work with a folding dual-screen handheld, so the revolutionary D-pad was created and Uemura realised this would be ideal for his new console. "Naturally, we could have used a joystick but we were thinking of [the Famicom] as a toy and toys you put on the floor. Children might step on a joystick and it could hurt their feet… and break the controller! Also, when we played, *Donkey Kong* Game & Watch we found we were only looking at the top screen. With a TV screen, you only look at that, not the controller. You need that sense, just using your fingers."

Of course, it proved to be an excellent design decision and the ergonomically-sound D-pad would become the industry standard for decades to come, even today, all of the current-generation consoles use it in one way or another. Not all the innovations of the Famicom controller were to be as influential, though, at least not in the short term. Uemura took the unusual step of including a microphone in the second controller, partly inspired by Japan's enduring love affair with karaoke. Was he really considering *Singstar*-style games at the start of the Eighties, we ask?

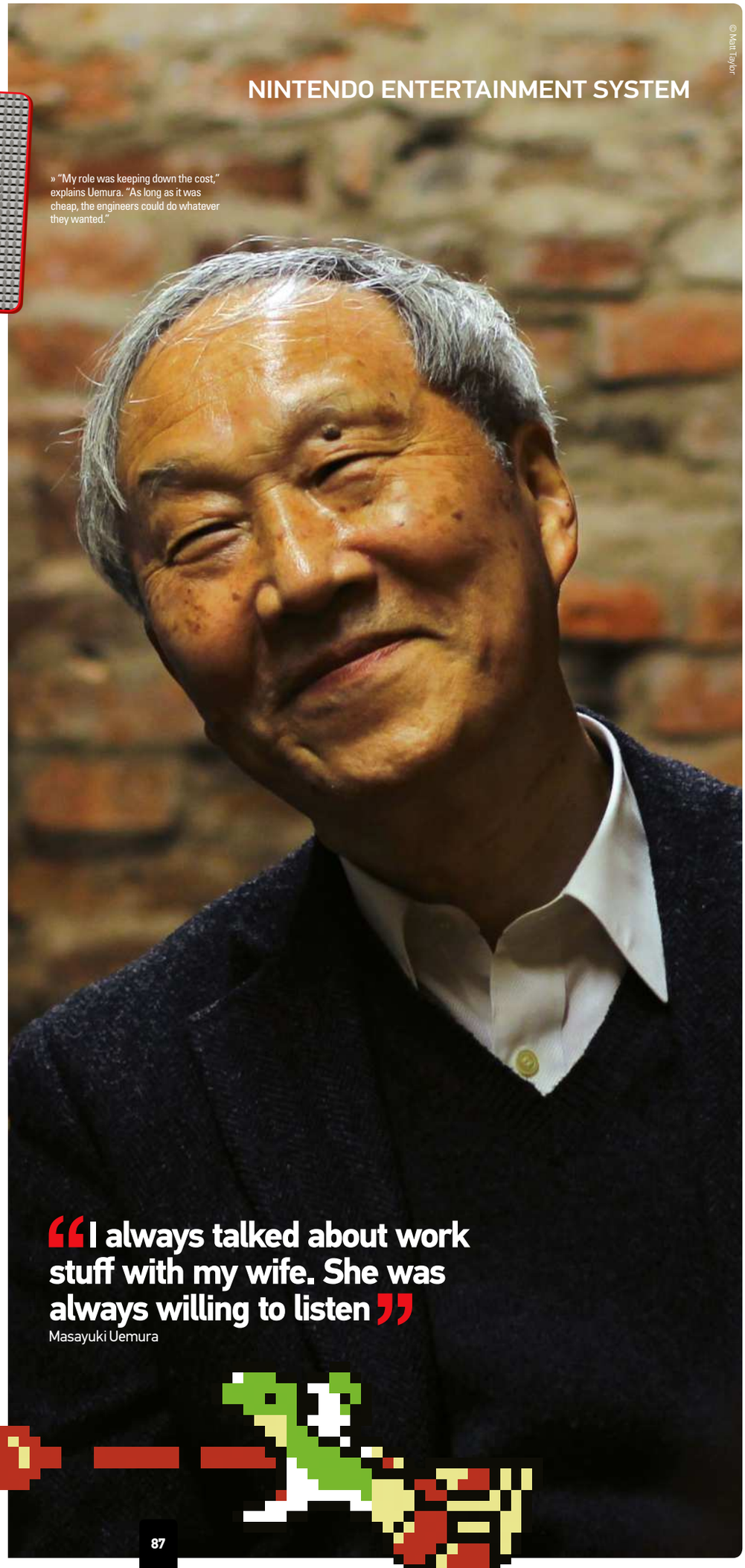
"I was thinking about it," he nods, with a twinkle in his eye. "I was also thinking about using the voice to play the role of the controller in games. I made sure the voice coming in from the microphone could be responded to by the CPU but only a few titles came out that made use of that function."

Clearly, it was an idea ahead of its time. With the Famicom project nearing completion and the core hardware taking shape nicely, there were still some cosmetic decisions to be made. It was decided that the cartridges themselves should be the same size as audio cassettes, allowing Japanese consumers to use pre-existing household furniture and containers to store their burgeoning game collection, and then there was the colour of the machine itself.

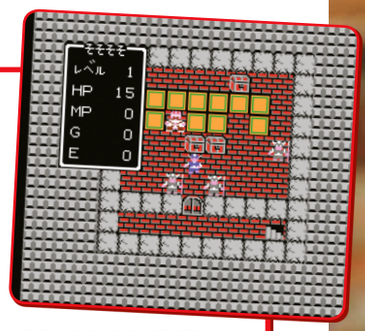
"We discussed the colour of the console a lot," remembers Uemura. "Should we make it look like a toy or more like serious hardware? In the end, President Yamauchi's favourite colour was red and so we used the same shade as his muffler."

If you're now worrying about Yamauchi's health – specifically his nose – we can assure you that we clarified exactly what Uemura meant by 'muffler' and were relieved to find he was referring to the President's scarf. Thus the aesthetically-pleasing strawberries-and-cream colour scheme of the Famicom was agreed on… except the console wasn't called that yet. The machine was not given its name until shortly before its release and Uemura explains his very personal connection with the naming process with obvious pride.

"I always talked about work stuff with my wife. She was always willing to listen. I told her the name [of the console] had not been decided and it was taking a long time to come up with a good name. There were already 'personal computers' in Japan and we were discussing that [our console]



» "My role was keeping down the cost," explains Uemura. "As long as it was cheap, the engineers could do whatever they wanted."



BATTLETOADS

■ Though Japanese and American developers dominated the NES release schedules, the console did at least have one notable British success story. Tim and Chris Stamper established their reputation for excellence on the ZX Spectrum as Ultimate but having changed its name to Rare, began a long and fruitful relationship with Nintendo.

DRAGON QUEST

■ A long-running series from Enix that started out on the NES, *Dragon Quest* (or *Dragon Warrior* as early titles were known in the West) helped popularise RPGs and establish mainstays of the genre, from turn-based combat and random encounters to controlling a party of adventurers as they battle to save the day.

» *Mike Tyson's Punch-Out!!* was superb, being a slick adaptation of Nintendo's popular arcade game.

was not 'personal', it was right there for everyone, so it had to be 'family', didn't it! My wife said, 'Okay, but it has to be Famicom. You have to make it shorter!' I took that idea straight to the company, that it should be 'Famicom'. President Yaumauchi said, 'What the heck is that?!' He really didn't like it. I explained this wasn't just a 'personal computer', it was for all the family and that we Japanese tend to shorten everything and I thought it was a good name. He said, 'No, it's not a good idea to shorten [the words] at the beginning. If people want to start calling it that later, that's okay, but at the start, we needed to call it 'Family Computer.'' So that's how the name came about!"

Nintendo's Family Computer was launched in Japan in 1983 and, according to Uemura, it sold 400,000 consoles that year, a respectable number though he is quick to point out that to be considered a 'hit' you needed to shift a million units. Moreover, defects in some of the graphic chips created by Ricoh and problems with the joypads soon became apparent. The Famicom had its controllers hard-wired to the console, which was a cheaper option than providing a joypad connector but proved costly in the long run. Nintendo hadn't anticipated passionate gamers mashing and yanking their controllers so aggressively in the heat of play and a damaged joypad meant the whole

"I always talked about work stuff with my wife. She was always willing to listen"
Masayuki Uemura

UNDER THE HOOD

Here's a look at the key components of the NES

EXPANSION PORT

■ This expansion port was included for the possibility of any extra add-on devices for the console, such as disk drives and modems. However, none of the projects using the expansion port ever saw the light of day, so it's a vestigial connector.

PPU

■ The Picture Processing Unit was custom-built for the NES, again by Ricoh. It was a very capable piece of graphics hardware in 1983, able to display 64 sprites and up to 25 colours on the screen simultaneously from a palette of 54.

CPU

■ The Ricoh 2A03, a modified version of the popular 6502 CPU, is an 8-bit processor running at 1.79MHz. It's a close relative of the CPUs used in the Atari 8-bit range, the Commodore 64, the Apple II and the BBC Micro.

LOCKOUT

■ The 10NES lockout chip enabled Nintendo to control who had the ability to release NES games, as well as enforcing regional lockouts between North American and European consoles. It's also a cause of the infamous 'blinking light' error.

RAM

■ The biggest limitation of the NES is its limited RAM: 2KB for reserved for general usage and 2KB for graphics. Cartridges often supplemented this with their own onboard RAM, according to their needs.

CARTRIDGE SLOT

■ Using a 72-pin connector rather than the 60-pin one for Famicom cartridges, the NES cartridge port was designed to replicate a video recorder's front-loading mechanism. However, the pins can easily become bent and dirty, leading to errors.

console was unusable. "The main thing I remember from that time is the defective consoles being returned," sighs Uemura, who estimates a staggering 100,000 faulty Famicoms came back during that first year. "All these problems we had to overcome! The whole company had to get involved to resolve them. Yes, I felt pressure but it was exciting because everyone was helping us out."

The company rallied round its new venture, partly, suggests Uemura, due to increased competition in the handheld market previously dominated by Game & Watch, and by the end of 1983, its stocks of the Famicom had sold out. "I thought that was the end of it," he shrugs. "Personally, I was pessimistic but then in February 1984, distributors started asking me when we were making more! Kids were asking for it. There is a custom in Japan for grandparents to give money to children and this is what they wanted to spend it on!"

Though Uemura maintains the initial launch of the Famicom in his home nation was generally viewed as 'a failure', there was still talk of the company learning from its mistakes and revamping the console for the US market. Nintendo did, at least, have some indication that its videogames were valued across the Pacific. The Nintendo Vs. System was doing well in American arcades and Uemura recalls seeing the February 1985 edition of trade magazine *PlayMeter* showing Nintendo titles such as *Vs. Tennis* and *Vs. Pinball* dominating the charts. Nintendo were still producing games that people wanted to play but the negative image of home consoles which had followed the spectacular downfall of Atari and other key industry players was a significant barrier to overcome.

"We thought by changing the exterior of our console, we could make ourselves seem different," explains Uemura. "The front-loading system for the NES was designed to make it look like a video recorder [not a games console]. Also, the US is a dry country so we wanted to shield the cartridges… we didn't want children getting [an electric] shock!"

» Like several high-profile releases, *The Legend Of Zelda* started off life on the Famicom Disk System.

» "We didn't want the sound to be too annoying in the house, even if it was played repeatedly," says Uemura of the Famicom's audio.

There were other, more physical, concerns that influenced the redesign of the Famicom for the American market. "The hands of American children are bigger than Japanese children. We were worried they might find it hard to use the controller. Also, they didn't have D-pads but we thought this might make our console stand out from those that used joysticks."

After the problems with the controllers in Japan, Nintendo decided to make the NES controllers detachable. It also dispensed with the microphone, figuring that karaoke was not a big draw in the States, thus saving on cost and they also recognised that American homes were generally larger than their Japanese counterparts so made the leads much longer. All sensible decisions though one addition for the US launch was a little more left-field. The console was bundled with its own Robotic Operating Buddy, or R.O.B., a toy robot that linked up with the NES. "We pushed that futuristic image," says Uemura. "This was not just a videogame. This was something new!"

The team also emphasised the primary 'entertainment' function of the machine by renaming it the Nintendo Entertainment System, a title which was only decided a month before the console's launch in the United States. Besides, the 'Family Computer' tagline had been used by rival manufacturer Mattel in its advertising for its Adam computer. Nintendo also included the NES Zapper in the package, after extensive market research had returned a not altogether unexpected finding. "Americans like guns", says Uemura, with a wry smile.

The NES launched in the United States in 1985 along with 17 games, predominantly titles taken from its Vs. arcade system. Porting tried-and-tested coin-op hits to home systems was a traditional way to boost console sales and indeed the kids of America were soon to be found playing *Vs. Tennis* et al on the many demo machines that had been set up in toy stores for free, rather than spending their precious quarters in the arcade. "It was still a risk," argues Uemura. "Just because these games were popular in the arcade, it didn't necessarily mean they would be in the home. The president of Toys R Us played the NES and said, 'This will sell!', which helped a lot. We were expecting sales of the NES to be 3 million. Then *Super Mario*

© Matt Taylor

MORE FROM UEMURA

COLOUR TV GAME SYSTEM

■ Nintendo took its first tentative steps as a console manufacturer in 1977 with the Color TV-Game 6. Featuring half a dozen versions of *Pong*, it was shortly followed by TV-Game 15, which served up more bat-and-ball games and added wired controllers, making it considerably more user-friendly. If you have a white version of the original unit, you have a real rarity as, apparently, only a few hundred were ever produced.

DISK SYSTEM

■ This Japanese-only peripheral allowed a disk drive to be attached to the Famicom console via the cartridge port and used bespoke floppy disks called 'Disk Cards' which could store 112K, which was a considerable size on its release in 1986. "Based on results, the disk system wasn't a good idea," acknowledges Uemura, "but from a developers [point of] view, it was rewritable and it did reduce costs." A release in the West was mooted but never materialised.

ZAPPER (BELOW)

■ Originally resembling a revolver when released in Japan to tie-in with the cowboy-themed *Wild Gunman* game, this lightgun was remodelled for the North American market, adopting a futuristic blaster look. Initially produced in NES grey, a version came in fluorescent orange, presumably to distance itself even further from an actual firearm. Many pixelated birds succumbed to its firepower when *Duck Hunt* was bundled with the console.

SUPER FAMICOM

■ What Uemura did next. He was lead designer again on what would become one of the most beloved consoles of all time and home to some of the best games ever made. Uemura politely declined to answer any questions about his follow-up to the NES during our interview, though alluded to many intriguing tales concerning its creation. Perhaps when the SNES also reaches 30 we'll get to hear them.

"Kids were calling our HQ in Seattle if they were stuck in a game or asking about secrets"

Masayuki Uemura

» "I would like to have added larger sprites," says Uemura when asked if he'd have done anything different with his console. "Characters were only 8x8 pixels."

TO THE MAX

The games and chips that expanded the NES' capabilities

MEGA MAN 2

CHIP: **MMC1**

■ The first of Nintendo's custom memory management controller chips was used to switch between banks of program and character ROM, and it added support for important things like game saving and multi-directional scrolling. As a result, many games used it – literally hundreds of them, from both Nintendo and its third parties.

SUPER MARIO BROS. 3

CHIP: **MMC3**

■ The most popular of Nintendo's add-on chips was used in many NES games, and provided additional RAM, a pair of selectable 8KB program ROM banks, two 2KB character ROM banks and four 1KB character ROM banks. A scanline-based IRQ counter is also included to improve split-screen scrolling.

COBRA TRIANGLE

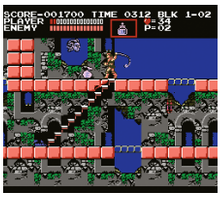
CHIP: **AOROM**

■ Chris Stamper's memory management controller is relatively simple, offering a 32KB ROM bankswitch and character RAM, but it has an odd quirk in that it uses one-screen mirroring, meaning that only one nametable is used for all four quadrants of the screen. As you might expect, it was used in games developed by Rare.

AKUMAJOU DENSETSU

CHIP: **VRC6**

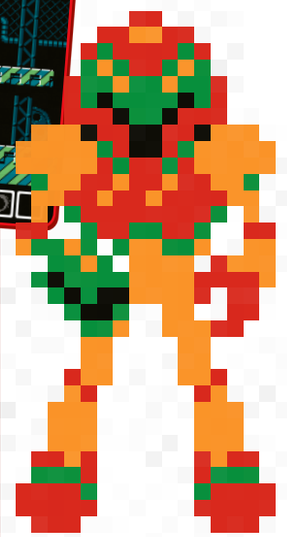
■ As well as offering bank-switching for both program and character ROM and a CPU cycle-based IRQ counter, this advanced chip added three additional sound channels. In the US and Europe, *Castlevania III* used Nintendo's MMC5 chip instead, as the NES can't utilise extra sound channels like the Famicom.



GIMMICK!

CHIP: **SUNSOFT 5B**

■ Sunsoft's FME-7 controller allowed for program ROM to be switched in 8KB banks and character ROM in 1KB banks, and contained a CPU cycle-based IRQ. However, the upgraded Sunsoft 5B version used in *Gimmick!* also included a version of the Yamaha YM2149, adding extra sound channels that set the game apart from its peers.



» *Metroid* was one of several NES games that featured a Password Pak, after starting off life on the Disk System.

▶ *Bros.* came out about the same time as it entered America. The rest is history."

New hardware needs a 'killer app', a piece of software that captures the public imagination and makes consumers snap up a machine. *Super Mario Bros.* must rank as one of the best examples of this, becoming the biggest-selling title in videogaming history at the time and igniting America's love affair with all things Mario. There was a real buzz about this new console from the East and Uemura remembers tales of phones ringing off the hook at Nintendo Of America. "Kids were calling our HQ in Seattle if they were stuck in a game or asking about secrets. Our employees couldn't work effectively! We had letters from parents, too. I remember getting some that were really unhappy we hadn't included Stage 2 [the pie factory] in the NES version of *Donkey Kong*. We had to say sorry, it wasn't possible, but it made me realise parents were really evaluating the NES."

So despite the initial predictions from experts that Nintendo was foolhardy releasing a console after the so-called videogames crash of the mid-Eighties, the NES ended up dominating the American and Japanese markets for the rest of the decade, ably filling the gap left by Atari's fall from grace. Was timing a key factor in the colossal success of the console, we ask?

"You understand the meaning of the word 'Nintendo'?", Uemura replies. "Leave luck to heaven," we answer. He looks us right in the eyes and chuckles, "Well, there you are."

As our time with Uemura draws to an end, an orderly queue forms of National Videogame Arcade staff politely asking if he might autograph various bits of NES hardware. We dutifully join the line along with our photographer Matt, who clutches a boxed console in mint condition. Neither of us owned the machine back in the day but, as with so many Europeans, we have come to love it in retrospect. As Uemura gets busy with a magic marker, we ask him how important it was to him that his console was embraced not just in his native Japan but across the globe?

"From a management perspective, of course we want to sell to everybody in the world," he says, after a long pause, "but it's not about that from an engineer's perspective. It's about whether the hardware they produce will be loved and esteemed by everyone. That's what we struggle to do. Personally, I thought it was great hardware but I didn't think it would be accepted [in the way it was]. And remember, the people that made the games did not grow up playing videogames. Creating something in their minds and interacting with it on a TV screen was really exciting for them. That excitement was passed on from the developer to the player at home. Hardware can allow you to go beyond your imagination. Like [James] Watt invented the steam engine and it set other people's imagination free…"

It's a powerful point and Uemura's answer gives us the required confidence to ask him one final question. What role does he think videogames have played in fostering an understanding and collaboration between the nations of East and West? A gentle smile spreads across Uemura's face.

"Childhood is universal," he says. "We are different cultures but we share that universal sense of childhood. To children, it didn't matter if this software was coming from the East or the West. Kids loved Mario and parents loved [the NES] because their kids loved it. Children will be excited by similar things despite cultural diversity. I'm teaching at the university in Kyoto right now and [the word] 'jump' is used in Japan, taken straight from English. Kids, anywhere in the world, want to jump! We could integrate that into videogames. It's about play. The NES also had an important role in transmitting Japanese culture to the world and we received influences from the rest of the world. If America hadn't invented consoles, we wouldn't have the NES!"

» Before the Wii, the NES was Nintendo's most successful system, with over 60 million units sold.

The Nintendo Entertainment System as a symbol of peace and understanding may be pushing it slightly but it undoubtedly makes us look at the unassuming grey breeze block in a different light. As we shake hands with Uemura and Aki and say our goodbyes, fellow journalist Gemma asks its creator what the console symbolises to him?

"It's the device that changed my life," he laughs. "It made it go crazy! After all these years, I'm still talking about it, coming here, all over the world."

More than thirty years from its UK release and the NES is still bringing people together. ✱

Many thanks to the National Videogame Arcade, Uemura's translator, Aki, Gemma at juicygamereviews.com and Matt Taylor at bit.ly/1SVZX3t for the photography.

Amstrad CPC 464

» **MANUFACTURER:** Amstrad » **YEAR:** June 1984 » **COST:** £239 (GREEN-SCREEN MONITOR) £349 (COLOUR MONITOR)

Arriving late to a hardware generation is never a smart move unless you've got a pretty impressive trick up your sleeve. But with the CPC464, Amstrad did just that. While the machine's development was, by all accounts, a somewhat bumpy road, launching with an all-in-one package made up for its late arrival to market – a built-in tape deck and bundled monitor (in both affordable green-screen and luxury colour variants) offered a level of value and convenience that its peers couldn't match, and Amstrad's debut gained traction staggeringly fast as a result. Sticking to European territories proved a smart move, too. More powerful hardware meant the CPC had a clear edge over Spectrum machines in terms of visuals (although this wasn't always utilised), while its focused marketing managed to offer a foothold against Commodore's somewhat diluted global advances.

While it was billed as an all-purpose computer, the CPC was clearly a games machine first and foremost, especially in the case of the 464. And while it couldn't offer all that much in the way of true exclusives – the early Amsoft range was, aside from a couple of titles, little to write home about – it did have a huge number of games available at launch and the quicker processor allowed for some superb arcade ports that often put their peers to shame. And while later Amstrad machines may have seen the company fail to repeat its original success, that will not change the fact that it managed to prove that being late to the party wasn't necessarily a bad thing. *

EDITOR'S CHOICE Get Dexter

Isometric games were all the rage in the 8-bit era, but few could offer the level of detail or character that ERE Informatique managed to squeeze into this superb adventure. Just compare this to the other isometric classics – *Knightlore*, *Batman*, *Head Over Heels* – and try to tell us that this isn't impressive. The use of colour and level of detail is leagues ahead of its peers and even though the game might have suffered from a lot of the problems as its stablemates, it's nonetheless a showcase for the sheer power of the CPC.

Hardware Fact

■ The CPC 464 was the first of six models released by Amstrad over a seven-year period. It was succeeded by the CPC 664, CPC 6128, 464 plus, 6128 plus and the GX4000, Amstrad's only console.

RAM: 64KB

PROCESSOR:
ZILOG Z80A (4MHZ)

OPERATING SYSTEM:
LOCOMOTIVE BASIC

FORMAT: CASSETTE/FLOPPY DISK (3")

TOTAL SOLD:
3 MILLION

EDITOR'S CHOICE
Alex Kidd In Miracle World

Sega's pre-*Sonic* mascot made his debut in this fantastic platform adventure. The monkey-like hero is memorable for running, jumping and punching his way through the kingdom of Radaxian, and occasionally hopping onto a motorbike or pedal-powered helicopter. This is one of the very best early Master System games and thanks to being built into many consoles, it's also the first Master System game that many players would have experienced. Just be warned that you'll probably need to track down a cartridge if you want to play it on the original Master System, as it was much more commonly built into the Master System II.

Master System Fact

■ The Master System's expansion port is officially unused, but is functional and has been used in custom hardware projects such as FM sound expansion boards and import adaptors.

PROCESSOR: Z80 8-BIT CPU (3.58 MHZ)
RAM: 8KB MAIN MEMORY, 16KB GRAPHICS MEMORY
GRAPHICS: CUSTOM SEGA VDP, 256X192 DISPLAY, UP TO 32 COLOURS ON SCREEN (FROM 64 PALETTE), 64 SPRITES PER FRAME
AUDIO: SN76496 PSG SOUND CHIP, 3X SQUARE WAVE CHANNELS, 1X NOISE CHANNEL
MEDIA: ROM CARTRIDGE (UP TO 8 MEGABIT), SEGA CARD (UP TO 256 KILOBIT)

Master System

» **MANUFACTURER:** Sega » **YEAR:** 1986 » **COST:** £99.95 (launch), £35+ (today)

Much like Nintendo, Sega chose to redesign its flagship console for export markets in the mid-Eighties, resulting in the makeover of the Mark III into the Master System. The black casing and strange diagram on the front of the console showed Sega pursuing a high-tech image, while the presence of a pause button on the console itself was an odd design choice carried over from the Japanese design. The system featured slots for both cartridges and low-cost cards, but the latter format was very limited and quickly phased out. The two-button joypads initially featured screw-in joystick attachments, but these were also phased out. The Master System design was eventually used in Japan for a deluxe version of the Mark III, featuring a built-in FM sound unit not present in the export model.

In North America, the format never gained major traction due to the overwhelming popularity of the NES. However, European distributor Mastertronic and Brazilian distributor TecToy established the Master System as the dominant console in those regions. The original model is less common than the Master System II in these regions today, but it is considered a lot more desirable due to its support for composite AV and RGB SCART outputs. *

Light Phaser

» **PLATFORM:** Master System » **RELEASED:** 1986 » **COST:** £30 (Boxed) - £10 (Unboxed)

When Sega was looking to create an export version of its Japanese Mark III console, it really went to town on localising the experience. As well as changing the name and shape of the system, it created a whole new peripheral aimed at the Western audience – the Light Phaser, a lightgun intended to compete with the NES Zapper. Sega's gun sported a sleek black look to match its host hardware and was well constructed, with good accuracy and a responsive trigger. Much like other contemporary guns, the Light Phaser uses momentary screen flashes to detect hits and misses.

When it launched alongside the Master System in North America, the Light Phaser was initially supported by the pack-in title *Safari Hunt* and a further *Marksman Shooting/Trap Shooting* combo cartridge. The gun also accompanied the console in the rest of the world, but never saw release in the Japanese market as it was incompatible with existing Mark III machines. The gun was supported for a good number of years despite not being released in the console's domestic market,with one or two titles a year trickling out until 1992, when a conversion of Taito's *Space Gun* became the 13th and final Light Phaser title. ✱

ESSENTIAL GAME
Operation Wolf

While the Light Phaser might not have the recoil action of the arcade cabinet's fixed gun, it does allow players to enjoy a rather excellent version of Taito's shooter, featuring all six stages and between-level cutscenes. In fact, it was so good that it became the bundled game in the Master System II Plus pack. While you can play it with a standard control pad, the gun offers a much better experience – and you can even use both in tandem to allow for grenades to be thrown. *Rambo III* runs it close, but this is our pick for the best Light Phaser game.

Phaser Fact

■ In North America, this tip was painted orange during later production runs in order to distinguish the Light Phaser from a real firearm. Some Brazilian models use blue plastic instead.

ZX Spectrum +2

» **MANUFACTURER:** AMSTRAD » **YEAR:** NOVEMBER 1986 » **COST:** £149 (LAUNCH), £30+ (TODAY)

When Amstrad bought the Sinclair brand name and the ZX Spectrum along with it in 1986, it's understandable that there would be fear, uncertainty and doubt over the future of Britain's most popular computer. However, Amstrad's first impression as a steward of the brand was a positive one – the ZX Spectrum +2 added some rather splendid new features to the existing ZX Spectrum 128K base. The biggest was the inclusion of a built-in tape deck, known as the Datacorder as it had been on Amstrad's computers. While it didn't have a tape counter (a fairly big oversight), it did mean that there was no more need to mess around with volume controls.

The other big new feature was the first-time inclusion of joystick ports, which conformed to the Sinclair Interface II protocol. However, Amstrad changed the pin-out of the joysticks, meaning that you'd either have to buy a converter or one of the new SJS1 joysticks introduced by Amstrad. The machine also looks a lot less cluttered thanks to the omission of the BASIC keywords that had always been dotted around the keyboard of older models, but you'll be hard-pressed to program in 48K mode as a result.

Hardware Fact

■ The revised ZX Spectrum +2A used the same motherboard as the ZX Spectrum +3. The BIOS detected which machine it was being used in by checking the attached storage devices.

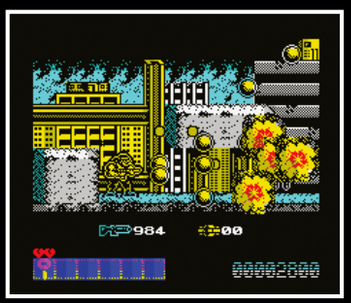
RAM: 128KB

PROCESSOR: Z80A (3.55MHZ)

AUDIO: AY-3-8192 SOUND CHIP (3 CHANNEL, 8 OCTAVE)

OPERATING SYSTEM: 32KB ZX SPECTRUM +2 BIOS ROM

FORMAT: BUILT-IN CASSETTE TAPE DRIVE, SUPPORT FOR OTHERS THROUGH EXPANSION PORT



EDITOR'S CHOICE

Midnight Resistance

As games grew more demanding into the late Eighties and early Nineties, the added capabilities of 128K Spectrum models were necessary to ensure the best experience – and that was especially true of arcade conversions. Sure, you could play *Midnight Resistance* on a 48K Spectrum, but the 128K version was the version of choice thanks to its music and the fact that all of the levels loaded in one go. Additionally, with the +2 you could get joystick control without having to fork out for the Interface II, which was essential for a game like *Midnight Resistance*.

The Rise Of The AMIG

GA500

As central as the Amiga 500 is to computing in the UK, it almost never existed. Now, as it enjoys its third decade, Kim Justice details how the A500 survived company shake-ups and fierce competition to become the defining computer of the late Eighties

Commodore had a bad year in 1985. The American company from West Chester, Pennsylvania lost $113 million over the course of 12 months, and a lot of its staff had jumped ship to its fierce rival, Atari – now owned by Commodore's former CEO Jack Tramiel, the man who Commodore chairman Irving Gould had fired in 1984. His replacement, an ex-steel executive by the name of Marshall Smith, had paid the price for Commodore's failings. Previously the top dog in the computer market, thanks to the C64, Commodore was now on the ropes – and its latest computer, the Amiga 1000, had floundered and sold badly. It was tough to see just what the future held for the company, and anything from a future producing IBM PC-compatibles to bankruptcy was predicted.

It is quite something to think that the Amiga's story could have ended here, before it even reached the shores where it would truly make its name. Indeed, the Amiga was so popular in the UK that it's hard not to think of it as a European computer, considering how much of the best games and best software for it ▶

Killer games

APIDYA

1992

■ A very colourful, *Gradius*-inspired horizontal shooter where you control a deadly bee and blast the hell out of other insectoid-based ships. *Apidya* is notable for coming with a killer soundtrack, courtesy of composer Chris Huelsbeck.

BATTLE SQUADRON

1989

■ This vertical shoot-'em-up received a very poor port to the Mega Drive, but was one of the best on the Amiga – a classically difficult old school space shooter with plenty of travelling through fortresses, cityscapes and the innards of aliens.

BILL'S TOMATO GAME

1992

■ Essential Rube-Goldberg-esque puzzle game where you have a brief time limit to try and position platforms, trampolines and lord knows what else in order to get a tomato from A to B. The Bill in question is Bill Pullan, designer of the game.

BLOOD MONEY

1989

■ One of DMA's first successful titles, the folks who gave us *Lemmings* also gave us this tough shooter, where enemies fly at you from all sides. It comes with an iconic spoken intro, classic soundtrack and DMA's typically zany sense of humour.

HUNTER

1991

■ This game was pulling off an open world in 3D long before anyone else, allowing you access to multiple types of vehicle and the ability to interact with people and bribe them for information. It's considered a precursor to what *GTA* would eventually become.

Making waves

We chat with ocean's Gary Bracey about the Amiga

What did the Amiga 500 offer over earlier Amiga models?
I think price was a major feature, and the form factor was very attractive, too, as it was an all-in-one', with disk drive, etc..

What made Ocean focus on the Amiga 500?
When Commodore shared their plans with us, we believed it would be a very successful home computer and so we offered our support in terms of making compatible games for it.

Where you concerned about given *Batman* away from free in the Batman Pack?
Not at all as they paid us per-unit! Obviously we didn't receive as much for each sale as retail, but we knew that the quantity would be significant.

Did Amiga games require more development?
No, not that I recall.

Why do you think that so many Amiga Ocean arcade conversions were so good?
Due to the processing and graphical power, we were able to emulate the fidelity of the original arcade games and so able to create very faithful emulations of those games.

▶ came from Europe. In America, it remains something of an obscurity – the Amiga line would struggle for momentum in a slowly-recovering market where IBM PC-compatibles were gradually taking over businesses and Nintendo held a near-monopoly on videogames with the NES. It took until 1989 for the computer to receive one final major advertising push, after which it effectively ceased to exist in its own country – a far cry from what happened to the Amiga in Europe during the same period. Those people who'd worked so hard on building the system were all too aware of what was occurring elsewhere, in places like Australia, Germany and the UK. Jeff Porter, Commodore's director of product development, and the man who led the creation of the A500, recalls "All of the Apple Guys thought that the Amiga needed to be sold in high-end business computer stores! Really? It's a friggin' games machine. Sell it in Toys 'R' Us like the C64 and they'll fly off the shelf. That's one thing that Commodore knew how to do – sell low-cost home computers. So I had a battle every day with the US sales company to buy into that strategy. Fortunately, Germany and the UK, for the most part, bought into that vision lock stock and barrel – Winfried Hoffmann [CEO, Commodore Germany] took one look at the A500 and said, 'I know how to sell this baby. Give me one. I'll show you.' And he did."

"I had a battle every day with the US sales company"

Jeff Porter

The man who would inherit Commodore's sad state of affairs was Thomas Rattigan, former CEO of PepsiCo. Thomas' main aim was to cut costs and bring Commodore closer to profit, but also to oversee new plans for the Amiga line that would keep it going. The solution, as announced by Thomas in January of 1987, was to introduce two new computers – one of them, the Amiga 2000, was a high-end model, a powerful machine built for businesses and those who wished to create. The other was the low-end model, entirely catered towards the home market with the requisite power at a competitive price – this computer would be the Amiga 500. Jeff Porter would head up the production of the A500, in spite of protests from the original Amiga team. "The biggest challenge was that the guys that built the A1000 thought I was 'killing their baby'. It was already dying. After investing $55M and only selling 77,000 machines, the ROI (return on investment) was not too good."

» Console owners would jealously look at the excellent *Xenon II*. At least until they got their own versions…

LIONHEART

1993

■ Thalion's hack-and-slash is a pretty good contender for the title of prettiest game on the Amiga, with beautiful worlds that are still striking to this day. With lengthy, involved levels and a whole load of enemies to encounter, the gameplay's no slouch either.

MOONSTONE: A HARD DAYS KNIGHT

1991

■ An RPG for as many as four players, where you try to find the keys to the kingdom. One of the more unique Amiga exclusives, and also one of the goriest too – there's no end of heads and limbs flying all over the shop.

PROJECT-X

1992

■ A frenzied shooter by Team17 that's quite possibly the most difficult of all the Amiga shooters. The challenge was such that most people couldn't manage to get further than the second level. There is a special edition that tones the challenge down somewhat.

TURRICAN II: THE FINAL FIGHT

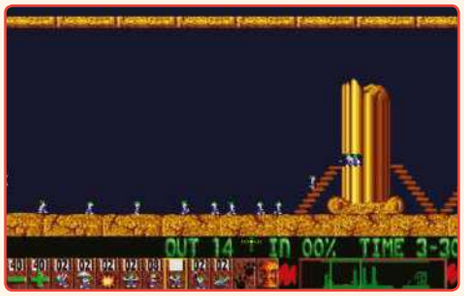
1991

■ This is arguably the greatest entry in Rainbow Arts' classic series of action platformers, filled with lengthy levels and secrets. Despite appearing elsewhere, Amiga *Turrican II* is the only proper 16-bit version of the game.

WAXWORKS

1992

■ A dungeon crawler where you travel through time in order to break a witch's curse. Well remembered not only for its level of difficulty and the atmosphere of its surroundings, but also for the still somewhat scary lo-fi brutality of its death screens.



» *Lemmings* was a huge success for Psygnosis and it soon had DMA Design creating sequels and add-on disks.

The main difference between the A500 and the A1000 was in the streamlined design – the A500, much like the earlier Commodore 64 and 128, would have an integrated keyboard and external 'brick' power supply. In most other ways, however, the insides of the 500 were similar to the original A1000, with the same 512K memory out of the box and Motorola 68000 chipset. The big difference between it and the A2000 was expansion – the A2000 came with several slots for the likes of Video Toaster cards and extra floppy drives, whilst the A500's expansion capabilities were mostly limited to upgrading the RAM. But this fit the A500's streamlined philosophy – it would have everything a user needed out of the box, with all possible upgrades being completely optional. It was also considerably cheaper for Commodore to produce.

"Because I came from the Commodore side of things, I knew Commodore's manufacturing very well," Jeff elaborates. "External brick power supplies were super cheap. Integrated keyboards were super cheap. Two-layer motherboards were super cheap. I got MOS Semiconductor (Commodore's chip fabrication division) to put the chips in plastic packages and improve the yields. And I knew the speed of all of the equipment in the factories, so I optimised the component selection to never have a bottleneck in the production line. Bottom line: Costs for the A1000 at $600+ got reduced to $200 for the A500, thanks to me! We sold it for $400, and street price was $500. That's pretty amazing margins, and the rest is history."

In spite of much-needed production improvements, there was always a level of disarray back home

Pushing pixels

We have a chat with Ocean's graphic artist, Simon Butler

What was it like creating graphics on the Amiga, after moving from the 8-bit systems of the time?

I recall it was a shock to the system to have so many colours and for sprites to be so much bigger after the horrible constraints of the 8-bit machines. It took a bit of getting used to, but it was just another part of the learning curve. I know that I relished the opportunity to push the animation a lot more than I had previously. That was great fun.

What art packages (if any) did you use and how effective were they?

It was the standard, Deluxe Paint. It did everything a games artist or even a hobbyist could ever require. I was still using it long after I had moved onto PC titles and was only forced to move onto another package many years later in order to retain a contract. To be honest, I was marginally proficient compared to a lot of people, and when I see some of the artwork created by today's artists it takes my breath away.

What companies managed to get the best out of the Amiga in terms of visuals?

I suppose the first name you think of is Psygnosis. They really did push things graphically, but for me that was also their main fault. I saw them as being the perfect example of style over substance. The Bitmap Brothers were also a team that truly stamped their own graphical style across every title they developed. There were some amazing graphics during the 16-bit era, but benchmark teams? Psygnosis and the Bitmaps.

Which of the Amiga games that you worked on are you most proud of?

It would have to be *Addams Family*. It's the game I enjoyed working on most in my entire career. Great team, amazing design and freedom to do whatever I wanted. Fantastic times.

Why did you return to the Amiga in 2012 to start work on the *Sqrxz* series?

Money, pure and simple. Being a 2D pixel pusher I have painted myself into a very small pixelated corner of the industry where I have struggled for long periods without work. In 2012 I was approached to do some pixels for a game I knew nothing about called *Sqrxz*. It was quick, cheap and cheerful and, over the years, I have been called upon to change the graphics for a variety of versions.

AMIGA 500

Amiga all-star

C64 maestro, Andrew Braybrook, on moving to Amiga

What was it like moving over to the Amiga 500 after working on the Commodore 64?
Short answer: it was fantastic. I'd owned an Amiga A1000 at home for two years before I started writing games for the Amiga, on an A500. I could see what people were doing on it and had been learning 68000 assembler programming in preparation. Instead of getting three 8-bit registers and 16 preset colours I was going to get 16 32-bit registers and a palette of 16 or 32 colours from my own selection of 4,096. The CPU was also eight times faster and the instructions were much more functional. It was like the driver of an old Ford Anglia waiting for his Lamborghini to arrive.

How do you feel the Amiga enhanced your games?
Firstly we could visualise more clearly what we wanted to show in the games. We'd been working with various colour limitations on the C64, as well as memory limitations. We only had space for about 192 sprite images so we were always hitting the buffers there. The Amiga had 512K of RAM, which was also all video RAM so although the code was bigger on the Amiga, it was a lower percentage of the total space. The sound was also more controllable because it was playing real samples, and we had an extra sound channel.

What was it like to code compared to the home consoles of the time?
The home consoles were still technologically on a march. Rod Mack was working on our football game on the SNES, which could do more tricks with the playfield (rotation, scaling). Also, the consoles held on to character modes that the C64 had, and that arcade games had used so well. All platforms tended to have a software and hardware development kit, so they were getting more expensive. Being locked to bitmap modes on the Amiga, although it gave a lot of freedom, meant that the screen was much bigger (typically 16K), and needed a lot of attention.

What's your favourite Amiga 500 game by another developer?
Turrican II for sure. The Factor 5 guys pulled out all the stops, with Chris Huelsbeck doing seven-channel music, hardware sprites aplenty, ingenious scrolling technique that they shared with us for *Uridium 2*, big play area, great playability – very nice.

"The Amiga, like the C64, was a games machine"

David Mowbray

» *Captain Planet* may not be a very good game, but he was a good name to have on an Amiga bundle.

▶ that would throw things off track and frustrate Commodore's world-renowned engineers."UK and Europe got it," Jeff says. "The US did not. It should've fired all the Apple execs that didn't know how to sell a $500 games machine, and given the product to the C64/C128 sales guys that sold computers by the semi-trailer-load to retail." Thomas Rattigan's announcement of the new Amigas was just about the last thing he did before inexplicably being fired by Irving Gould, who then took over the CEO job from his home in the Bahamas. While there was always trouble on the home front, Commodore's international hubs were largely run autonomously, only ever seriously communicating with Commodore HQ a couple of times a year. And so, Commodore's UK hub enjoyed a comparatively serene existence – it hadn't topped the market up to this point, but the C64's sales were enough to make it one of the most popular computers on the market. As the last generation's micros wound down, Commodore's European divisions were eager to get the new Amigas out there, believing them to be more than capable of getting the top spot. It wouldn't be straightforward, though – the Atari ST had successfully penetrated Europe, becoming the leading 16-bit computer on the market. STs were selling well in the UK. More than that, Atari had both created a market for the ST in France that it would never let go of, and overtaken Commodore in West Germany – once Commodore's European stronghold. At this point, the Amiga had barely broke the market at all, and Atari had enjoyed a huge head start in the region – overhauling Atari's ST certainly wasn't going to happen overnight.

Looking at the main statistics, the Amiga and Atari ST are very comparable, with both computers based on the Motorola 68000 microprocessor. Indeed, when you consider that most computers were marketed based on memory at this time and Atari was already offering 2MB and 4MB ST models before anybody else, it could be said that the ST – in this very sellable regard – was the more powerful machine. But the Amiga had a couple of tricks up its sleeve that, before too long, would start to show the difference – it's 'Agnus' chip was very powerful, and, in particular, included a dedicated blitter that could run graphics routines without any strain on the computer's main memory, and a copper chip that allowed for multiple video resolutions and colour depths to happen on the same screen. The main video processor ('Denise') could split the screen area into multiple bit planes, allowing for as much as 32 unique colours on the screen at

» Team17's frenetic *Alien Breed* from 1990 was one of many games that defined the Amiga 500.

once. David Mowbray, previously a programmer at Flair Software, explains how this benefited games: "The Amiga, like the C64, was fundamentally a games machine. The machine was just more friendly [than the ST] when you're making a game – even on the screen itself, everything was separated onto different Bitmap planes, so, for example, you could have 16-colour art but have one of the planes just for your parallax layer."

Alongside Agnus and Denise was the third chip – 'Paula', which was responsible for sound and contained four sample-based sound channels, wholly different to the Atari ST which relied on a four-channel AY synthesiser chip. Chris Huelsbeck, a composer who worked on games such as *The Great Giana Sisters* and the *Turrican* series, explains the possibilities. "The Paula chip was really straightforward," he begins. "Its great power was in the capability to play recorded or digitized instruments and sound effects… essentially there was nothing in terms of audio or tones that you could not get out of the Amiga – the only limitation was memory and channels, and even then on that front we found ways to enhance it." One of those ways, funnily enough, would involve the use of an Atari ST – the A500's fiercest rival was an integral part of Chris' 'seven-voice' system that seemed to, as if by magic, nearly double the amount of channels the Amiga had," Chris says. "My colleague and

» Odds were, if you saw *Defenders Of The Crown* running on an Amiga 500, you'd most likely try to work out a way to own one.

Trouble in paradise

Jeff Porter talks about turbulent times at Commodore

What was the situation like at Commodore before the announcement of the A500 and 2000?

Things were pretty dire. The A1000 was critically acclaimed but financially a bomb. At $1,295, it was too expensive as a home computer, and wasn't expandable enough to be a business computer nor did it have mainstream business apps. So the A500 at $500 filled the home computer void, and the A2000 filled the 'can't expand this sucker' void. Although it took the better part of a year to pivot that way... the results speak for themselves. It was the right thing to do.

As head designer for the A500, how often would you interact with CEO Thomas Rattigan?

He was relatively hands-off. Of course there would be high-level meetings where the end result was, 'Jeff and his team just need to work a little harder and faster.' I remember one meeting where him and Marshall Smith had summoned everyone from R&D both in PA and CA to West Chester. Rattigan put his feet up on the boardroom table and said, 'Marsh, what do you think the most important thing for engineering to be working on now? I think it's the cost-reduced C128D.' You can imagine the gasps coming from the Los Gatos team... 'Are you kidding me? Did he really just say that to the entire senior R&D staff of the Amiga?' Yes, he did.

Was there any perception inside Commodore that the A500 was a downgrade from the A1000?

Lots of fights with the Los Gatos crew. I kept hammering on the $500 price point at retail – $20 more for a detachable keyboard, $30 more for an internal power supply, $20 for a keyboard garage, you just blew the budget, guys! Sorry. Plus Jack and the Atari ST were just starting to eat our lunch and we had to attack with a product that could kill the ST. That last argument cleared the way with everyone at Commodore to let me build the A500.

In what ways did you feel that the A500 improved on the A1000?

Obviously the cost was the major improvement – same circuitry and same performance, but at a way cheaper price. I personally selected the keyboard – NMB real key switches... I loved that keyboard. I'm a pretty quick typer and I could just fly on that baby, that got cost reduced after the first year, but hey, the A500 was already a huge success by then to create very faithful emulations of those games.

Marketing magic

Commodore marketing director David Pleasance on the Amiga

What gave the Amiga 500 a better commercial edge over previous systems?

My belief is that it was the way we positioned our marketing – aimed squarely at out target audience – which was the slightly older child, perhaps getting ready to study for critical exams, from middle class or higher socioeconomic families whose parents wanted to be seen to be responsible enough to equip their child with the latest and best technology.

How did strike the deal for the Batman pack?

I had heard that Ocean Software had just been to Hollywood and had paid out $1 million just for the rights to use the *Batman* movie title for the game they intended to produce. So I set up a meeting with David Ward and Jon Woods (joint managing directors of Ocean) along with Colin Stokes (sales director) and Paul Patterson (sales manager).

I told them, 'I am going to make you a proposition that you will either have the balls to go along with, *or* you will send for the men in white coats to come and take me away.' I told them that I planned to produce a pack – which if they said yes to me – [that] would feature *Batman* all over the box, and that the fact that there was an Amiga 500 inside was almost incidental. I promised we [Commodore] would be spending a massive amount of money marketing and promoting the pack, in conjunction with their own marketing parameters so we had a massive joint approach.

I said, '1) I want you to give me the game exclusively in my pack for two months before you release it is as a game on its own; 2) I want to pay you very little money for it, and 3) I am only prepared to commit to 10,000 pieces.' Ocean expressed concern on two fronts: they were worried their dealers would be angry that the only way their customers could get hold of the game would be by buying a *Batman* pack [and they] had estimated it was going to cost them a further $1 million to actually produce the game, and were concerned this activity might affect the volume of games they had calculated they needed to sell in order to [make] a profit.

I explained to them that I personally felt – if the promotion was successful – the dealers would actually be delighted, as they would be selling lots of £400 packs instead of lots of £40 games. I explained that with my massive marketing budget added to theirs we would take over the retail channels completely, and I was confident they would do better overall if they decided to work with me.

Well they did have the balls to do it and the net result was, 1) Their dealers ended up much more than happy; 2) Ocean sold five times the volume they had estimated they would sell; 3) Commodore did not take just 10.000 pieces of *Batman* – we ended up taking 186,000 pieces – because that is how many Batman Packs we sold in the 12 weeks period to Christmas!!!

What was Commodore's relationship like with Ocean after that?

Absolutely fantastic. I can also say after the success of the Batman Pack I was approached by a vast number of games developers and publishers who would do almost anything to have one of their products included in [our] forthcoming packs.

Why do you think the system is so fondly remembered by gamers?

My opinion is that we released this incredible (easy-to-use) multitasking technology at exactly the right time. The world's youth were desperately hungry for something new, something which allowed them to show off and illustrate their creativity – and just take a look – all around the world we have many thousands of Amiga fans, many of them now holding senior positions in huge companies. I am so proud to have contributed my small part in this legacy.

▶ friend Jochen Hippel coded the kickass core of the [ST] CPU mixer in order to play back four-voice Amiga music on the ST. With his blessing, I ported that back onto the Amiga and it was used first in the *Turrican II Title Theme*, which to this day remains one of my best-known pieces." Essentially, a four-voice piece of music would be programmed on the ST, mixed down and then played back on the Amiga using only one of its channels, leaving three extra channels open.

Together, these chips would make up Amiga's 'Original Chip Set', or OCS for short. While the OCS had so much potential, it took time to fully realise this. The Amiga's earlier games, while flashy, were still traditional computer titles – a game like Cinemaware's cutscene-filled strategy title *Defender Of The Crown*, for example, was impressive compared to other computer games, but still very much a computer game – a strategy game, and one not very different from its Atari ST version. Arcade ports, on the other hand, were often worked on by small teams with limited time and resources at their disposal, so with the Amiga and ST both being 68000-based computers, ports of arcade titles – such as *Out Run* and *Super Hang-On* – were similar on both platforms and would not take advantage of the Amiga's features, often leading to them being described in magazines as 'ST ports'. It would take a couple of years until people would harness the Amiga's power to make original arcade-style shooters and platformers that were of similar quality, if not better than anything that could be found on consoles at the time.

» On the surface, Ocean's *Batman* is just another licensed game. As a pack-in title in 1989, it would make the Amiga into a superstar.

Defining developers

BITMAP BROTHERS

FIRST AMIGA RELEASE: 1988

■ Famed for hi-octane, futuristic games with soundtracks that could be club favourites, Bitmap Brothers gave us the likes of *Xenon 2*, *The Chaos Engine* and the *Speedball* series. Nearly every game that it released for the Amiga was a hit.

BULLFROG

FIRST AMIGA RELEASE: 1988

■ The land of Peter Molyneux, and home of the God game in the form of *Populous*. Not content with just that, it also released games like *Powermonger*, *Syndicate*, and *Theme Park*. Ultimately, Bullfrog was acquired by EA.

CINEMAWARE

FIRST AMIGA RELEASE: 1987

■ One of the Amiga's original big developers, Cinemaware released cutscene-heavy games with minigames and a big emphasis on story, such as *Defender Of The Crown*, *It Came From the Desert*, and arguably its best title, *Wings*.

GREMLIN INTERACTIVE

AMIGA DEBUT: 1988

■ A studio that was successful throughout the Amiga's lifespan in a wide variety of genres. It made racing series such as *Lotus* and *Top Gear* and sports games like *Premier Manager*, but arguably its most successful title was 1992's *Zool*.

"It was like a turbo C64 in how it was put together"

David Mowbray

» Games like *Turrican* proved that the Amiga 500 was more than capable of delivering arcade-like experiences.

Things really started to shift in favour of the Amiga in 1989, as several games showed just what power the Amiga had lurking within. Psygnosis' *Shadow Of The Beast* is a major example, using the Amiga's copper chip to create a multi-layered landscape filled with parallax scrolling that ran smoothly. Simply put, the Atari ST didn't have these tricks at its disposal – while it could handle vertical scrolling fine, horizontal scrolling required almost everything on screen to move at once, making it slow and jumpy by comparison. While the development of the original Amiga had happened outside of Commodore, the A500 was in many ways an evolution of the C64, sharing a lot of its more coder-friendly aspects, such as hardware sprites and scrolling, as well as its slick, integrated, games-friendly design. In the end, a lot of the people who had previously preferred Commodore's old system found themselves drifting towards its new machine. David Mowbray had experience with both. "The Amiga was more in the vein of what I was used to," he says. "I learnt 68000 assembly language and software sprites on the ST, and none of the hardware scrolling that I'd had on the C64 was there – it was a lot like the Spectrum, a very different way of working. Going from the ST to the Amiga was like going back home again – it was like a turbocharged C64 in the way it had been put together."

Shadow Of The Beast was one of many pioneering games released for the Amiga in 1989, a year that also saw the release of *Lemmings*, *Xenon 2*, and *Populous*. These games would become synonymous with the Amiga and would set it out as clearly the superior games machine to the Atari ST, but games alone weren't enough – the computers themselves needed to start flying off the shelves. Commodore's American HQ had largely disregarded the games market even after the launch of the A500 (Jeff: "We walked away from our shelf space at Toys 'R' Us and Sears, and that void was then filled by Nintendo and Sega…"), whereas Commodore UK was under no pretence that the A500 was anything other than a games machine – and it was the job of then-marketing director David Pleasance to maximise that. He would do so with the introduction of Entertainment Packs and bundles.

A typical Amiga bundle, such as the Cartoon Classics set from 1991, would of course focus primarily on games – in the case of this example, two very popular titles in the shape of *Lemmings* and *The Simpsons: Bart Vs. The Space Mutants*, as well as a lesser-known title with a recognisable name (*Captain Planet*) – because even if a

PSYGNOSIS

AMIGA DEBUT: 1986

■ This rose from the ashes of Imagine Software to form one of the Amiga's greatest software houses, with games like *Shadow Of The Beast* and *Lemmings* to its name. Later acquired by Sony, it would take that standard onto the PlayStation.

RAINBOW ARTS

AMIGA DEBUT: 1987

■ A software house that specialised in very challenging action games like *X-Out* and the *Turrican* series. Home to some of the strongest individual coding talents of the era, it would excel either on computers or consoles.

SENSIBLE SOFTWARE

AMIGA DEBUT: 1989

■ Jon Hare's studio was renowned for its popular games, often involving tiny little people running about. Strategy game *Mega-Lo-Mania* was the first to explore the format, and was followed by classics like *Sensible Soccer* and *Cannon Fodder*.

TEAM17

AMIGA DEBUT: 1991

■ Like Gremlin, Team17 would shine in almost any genre it put its hands to – whether it was top-down shooters (*Alien Breed*), one-on-one fighting (*Body Blows*), cute platformers (Superfrog), or annelid-based carnage (*Worms*).

» Arcade conversions on the Amiga 500 were hit and miss. The excellent conversion of *Super Hang-On* is one of the better examples.

The inside story

Commodore engineer Dave Haynie talks Amiga 500

What was your involvement on the Amiga 500?
I was brought onto the fairly early Amiga 500 project from the 8-bit world, in 1986. I had already been learning to program the Amiga, as I bought an A1000 in 1985, not too long after they came out. We were trying to interest management in some new version of the C128, but most things were moving [towards the] Amiga at that time. So I spent most of that month learning the Amiga and A500 architecture, helping track down problems, that kind of thing.

Why do you think the machine struggled in the US compared to the Commodore 64?
Commodore marketing in the USA really had no clue how to sell the A500. It might look like an A500, but at the time the AmigaOS was more sophisticated than anything from Microsoft or Apple, so it needed a real computer store. Commodore wanted to sell in the same big department and discount stores that carried the C64, like K-Mart and Sears – doing this, of course, made it practically impossible to any computer store that wanted to carry the A500 to do so profitably. They all bought through distributors, but big national stores were their own distributors, buying directly from Commodore. And Commodore had done much the same thing with the C64: selling it originally in discount stores while it was still in computer stores. Some computer sores found the C64 being sold at a discount store for less than they paid their distributor. Commodore screwed up their own future by thinking about short-term gain in volume.

Why do you think it had so much success in Europe?
Kind of the opposite [to the USA] – they were marketed and sold correctly. Also, a different set of competition, less Apple, more smaller computers like Sinclair, Amstrad, Acorn. And an actual marketing budget… in Europe, you knew about the A500 if you read magazines or watched TV.

What's your favourite A500 game?
Marble Madness. It blew me away when it came out, and I spent lots of time testing it in the lab on new hardware. It's totally the case that, over the years, I got busier at Commodore and didn't play games much. I love computer games, but the problem is, they got so good, you could spend days solving one game.

"Oh well. It was a fun ride while it lasted"

Jeff Porter

licensed game like this was not well-known or well regarded, the character, movie or TV show would be. These packages also usually contained the versions of Workbench and Deluxe Paint – which would feature on the box, albeit not as prominently as the games. All of this would be available for £359, then reduced to £299.

Many of these bundles were successful, but the one that stands above them all is the initial 'Batman Pack'. Alongside the ubiquitous Deluxe Paint II, the Batman Pack contained three games – *Batman* (naturally), *The New Zealand Story*, and *F/A-18 Interceptor*, filling the roles of the very popular licensed game, the popular arcade port, and a game that your dad would probably enjoy more than you did. But, of course, *Batman* was the main event, and quite a coup to get in such a pack – not only had the game just been released by Ocean, but 1989 itself was the peak of Batmania – the film was the highest-grossing movie of the year, and the aisles of toy stores were filled with *Batman* merch. *Batman* toys sold in their millions, and the Batman Pack would be but one part of that, with no new computer or console around to compete with it in the Christmas period. The Batman Pack truly made the A500 a star – the success of it alone brought an estimated 2 million new people into the Amiga's user base. A year that had been the computer's last hurrah on American soil ended in Europe with its coronation as the most popular computer on the market.

» The gameplay wasn't amazing, however *Shadow Of The Beast*'s stunning visuals certainly captivated gamers.

During the Nineties, the Amiga continued to hold its ground against the 16-bit consoles of the day, further augmented by new models such as the A500+ (featuring the 'Enhanced Chip Set'), the A600, and the CDTV – a consolised A500 capable of running CD-ROMs. However, these products were beset by old Commodore issues, such as a lack of marketing sense and serious overspends on production – the original CDTV's CD-ROM drive, for example, cost 500 dollars. When Jeff Porter headed up production on a revised model, he found a different mechanism for the drive in Japan that cost $15 for similar performance. The A600 was an even greater horror show – one that spiralled somewhat out of control. "Mehdi [Ali, then-CEO of Commodore HQ] hired a guy named Bill Sydnes to cost reduce the A500… good luck!" says Jeff. "He claimed he could half the cost of the A500 and Mehdi agreed. In the end, the A300 had to be renamed to the A600 since it was *more* expensive than the A500!" A lot of this was down to events back home – as Commodore continued to lose ground, it chose to squeeze as much as it could from its existing products rather than budgeting enough money for engineering and R&D to build better models. By the time the A1200 and 4000, Amiga's 32-bit line of computers, arrived in late 1992,

it was too little too late – Amiga-based games were now being matched by games from Intel 486-based PC's, and then surpassed by Pentium-based PC's. And so, games companies who had made their name on the Amiga started to look elsewhere – leaving the new machines with precious little in the way of big titles that weren't available on the PC. Those in the corridors of power hardly helped matters. "Mehdi introduced the A1200 the day after Thanksgiving for only a few dollars more than the A600," Jeff says. "He had a warehouse full of A600's, and no inventory of A1200's. Commodore nearly died that Xmas. He did it again the next Christmas and that was all she wrote."

For those in Europe, where the Amiga had enjoyed success, it was frustrating – despite its best efforts, the team couldn't stop Commodore as a whole from going down on 29 April 1994. "In spite of the fact that I should have had some major clout from the A500, they didn't listen to me," Jeff laments. "Oh well, it was a fun ride while it lasted." It's fair to say that the majority of Commodore's engineers who lost their jobs that day shared those feelings. Commodore UK, successful enough to not be liquidated, pooled its resources together and tried to take over the company as a whole. It was seen as the frontrunner, and at several points it seemed like Commodore UK's takeover (which would involve a name change to Amiga) was a done deal – but a long and drawn-out process ended with computer manufacturers Escom buying the Amiga in 1995, and Commodore UK's closure shortly thereafter.

Although it originated in a country where it would only ever be a bit-part player, the Amiga 500 was successful enough that in many ways you could consider the UK and Germany Amiga's second home, particularly when you consider not only the sales of the machine, but the sheer amount of games and software that was created by European developers for the machine. The Amiga leaves behind no end of fine memories, and those who were closest to it leave a great legacy. Chris Huelsbeck sums up best by saying, "Amiga was a leap forward when it was introduced. I am looking back fondly and a bit sad how it ended, but I'll never forget the good old days, the makers, the creators and all the fans that made it happen!" *

» *Sensible Soccer* was a huge success for Sensible Software. A hit sequel soon followed.

We'd like to thank all of our interviewees for their help. Jeff's writings can be found at porterdigitalsignage.com/Blog.html. Chris can be found at huelsbeck.com. The author would also like to thank Adam Spring (Remotely Interested Podcast) and Zachary Weddington (Viva Amiga) for their input.

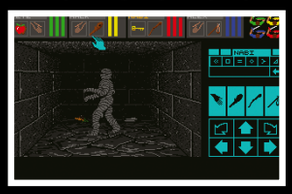
Atari 1040ST

» **MANUFACTURER:** Atari Corporation » **YEAR:** 1986
» **COST:** $999 (LAUNCH), £30+ (TODAY)

While Atari had already launched the 16-bit 520ST in 1985, the company's introduction of the 1040ST in early 1986 was a watershed moment for the home computer market – for the first time, a complete computer with one megabyte of RAM was available for less than $1,000. However, for gamers the most attractive inclusion was the built-in floppy disk drive, which carried over to the new Atari 520STF, and then the later inclusion of an RF modulator for TV output in the STFM models.

Thanks to its affordability, always a key part of the business model that Atari owner Jack Tramiel employed, the Atari ST line was particularly popular in the home computer market of the late Eighties – and this was especially true in European countries. While the Amiga's audiovisual hardware made it preferable for some players, high value software bundles such as the Power Pack and Mega Pack positioned Atari's machine strongly with gamers. However, the rise of the PC market and Atari's decision to focus solely on the Jaguar saw development of the ST line discontinued in 1993. Despite this, the machine remains popular with hobbyists, particularly amongst musicians due to its utility in the production of MIDI music.

EDITOR'S CHOICE



Dungeon Master

If you're going to play a role-playing game on the Atari ST, the best selling one of them all is probably a good shout – and *Dungeon Master* is that game. All the traditional fantasy elements were in place, but the game broke with the tradition of the genre by making your actions much less abstract. Instead of taking part in turn-based action, players could explore and fight in real time, meaning that if a monster was approaching it was doing so *right then*. Likewise, skills were developed simply by actually using them, rather than building experience points.

Atari ST Fact

■ The digital hardcore group Atari Teenage Riot took its name from the Atari ST it used to make music – and still uses it to compose and perform to this day.

RAM: 1MB

PROCESSOR: MOTOROLA 68000 (8MHZ)

AUDIO: YAMAHA YM-2149 SOUND CHIP (3 CHANNEL SQUARE WAVE, 1 CHANNEL WHITE NOISE)

OPERATING SYSTEM: 192KB TOS ROM

MEDIA: BUILT-IN DOUBLE-SIDED FLOPPY DISK DRIVE (720KB CAPACITY)

NES Advantage

» **PLATFORM:** NES » **RELEASED:** 1987 » **COST:** £39.95 (LAUNCH), £30+ (TODAY, BOXED), £10+ (TODAY, LOOSE)

Nintendo's official joystick for the NES might not seem like much given the standard of arcade-style controllers that would follow, but for the late Eighties it was a trailblazing product. As well as the small joystick and four regular buttons, the NES Advantage had some neat tricks of its own. First of all, the A and B buttons offered a turbo fire option, with individual activation switches and adjustable speed dials to achieve the optimum rate of fire. There was also a switch marked 'Slow', which achieved a slow-motion effect by rapidly hitting the start button, pausing and resuming the game in progress. This feature was unheard of at the time, but soon became a popular inclusion on controllers for all formats. Finally, the controller actually includes two connectors and a switch to choose between player 1 and 2, so that both players can use the NES Advantage in multiplayer games where players take turns.

The NES Advantage is a treat for any fan of the NES aesthetic, as the design and colour scheme mimic those of the console itself. The large buttons are satisfyingly springy, and while the joystick isn't microswitched, the ball-top design is at least a familiar one to regular arcadegoers. *

ESSENTIAL GAME Gun-Nac

Shoot-'em-ups can always benefit from a good joystick controller, especially one with an excellent turbo function, and *Gun-Nac* is a very good example of this. After adjusting the dial to the sweet spot, you'll be pumping out hot laser death at previously unseen speeds. It also doesn't hurt that Compile's flair for crafting fast-paced and memorable shoot-'em-ups is on full display here, ensuring that this blaster is one of the finest available for Nintendo's 8-bit platform. The only downside is the extraordinary cost of purchasing a copy for yourself, as even loose American NES cartridges routinely pass the £150 mark.

NES Advantage Fact

■ The NES Advantage makes a memorable cameo during the climax of *Ghostbusters II*, as it was used to control the Statue Of Liberty as it walked through New York.

Control Stick

» PLATFORM: MASTER SYSTEM **» RELEASED:** 1987 **» COST:** £14.95 (LAUNCH), £10+ (TODAY)

As a major manufacturer of arcade games for the whole of its history, it should come as no surprise that Sega would introduce an arcade-style joystick for any of its home consoles. What *is* surprising is this Master System controller, which broke convention in a number of ways. At the time, most joysticks used either the classic ball-top design that's common in Japan, a straighter stick as was more common in the West, or a flight-style design with integrated trigger-style buttons. Sega opted for none of these, instead employing a unique, but somewhat unwieldy, T-grip design with a large cuboid top.

However, the bigger and more obvious break with convention is Sega's choice to place the buttons to the left of the stick. While it might be a boon to left-handed players, it's a totally bizarre design choice which was almost never replicated. In fact, the only other controller we can think of that did this was the Sega Sports Pad, a Master System trackball peripheral which was discontinued after a short time. A more traditional successor called the Arcade Command Stick was advertised in 1988 but ultimately never released, and future Sega arcade sticks would all use more traditional parts and layouts. ✱

Control Stick Fact

■ Unusually, some boxes for this peripheral advertise its compatibility with a number of non-Sega consoles and home computers, including the Atari 2600, Commodore 64 and more.

ESSENTIAL GAME Bubble Bobble

The Master System is well-served with arcade conversions and arcade-styled games, so in truth, most of the console's library would work well here. However, we've got a soft spot for Taito's excellent conversion of the classic platformer *Bubble Bobble*, which feels pretty good to play on the stick. This conversion is very faithful to the arcade original, with graphics and sound that are as close as possible on Sega's 8-bit hardware. It also added new secret rooms, new items and extra boss fights, giving it something unique to boast of when compared to other conversions.

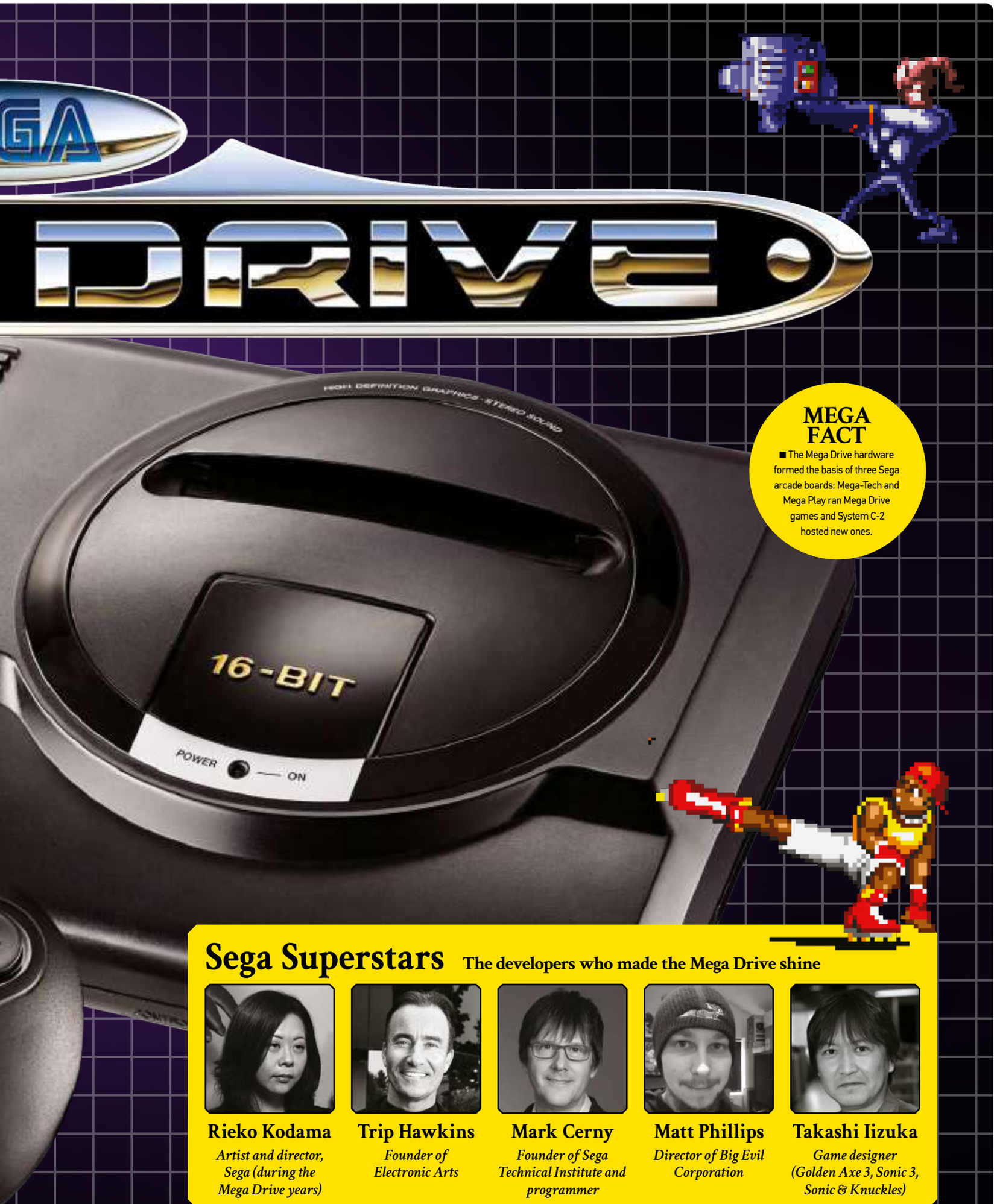
Inside the MEGA

When Sega set out to replicate its arcade hardware in an affordable form, it ignited a console war and captivated a generation. Retro Gamer speaks to key developers to learn about the technological factors that made this 16-bit console a classic...

Words by Nick Thorpe

If there's one thing that characterises Sega during its years as a console manufacturer, it's a relentless pace of technological development. By the middle of 1986, the company had put together the SG-1000, an exterior redesign in the form of the SG-1000 Mark II and the vastly upgraded Mark III. The design of the Master System, the export version of the Mark III, was finished and manufacturing had started. Having released four pieces of hardware since 1983, it might have seemed like Sega should take a break. However, none of the company's releases had helped it to claw market share away from the dominant manufacturer, Nintendo.

To try to make an advance in the market, Sega began work on a 'Mark V' console designed to achieve a true generational leap. In the book *Sega Mega Drive/Genesis: Collected Works*, Masami Ishikawa explains that the primary goals in producing the Mega Drive were to retain compatibility with the Master System, and to provide the basic performance of its relatively new System 16 board. This board was already powering hit games like *Fantasy Zone*, and would remain an active part of Sega's development plans for the remainder of the Eighties, hosting games such as *Shinobi*, *Alien Syndrome*, *Altered Beast* and *Golden Axe*. This project would ultimately become known as the Mega Drive (or Genesis, in North America). ▶



MEGA FACT

■ The Mega Drive hardware formed the basis of three Sega arcade boards: Mega-Tech and Mega Play ran Mega Drive games and System C-2 hosted new ones.

Sega Superstars

The developers who made the Mega Drive shine

Rieko Kodama
Artist and director, Sega (during the Mega Drive years)

Trip Hawkins
Founder of Electronic Arts

Mark Cerny
Founder of Sega Technical Institute and programmer

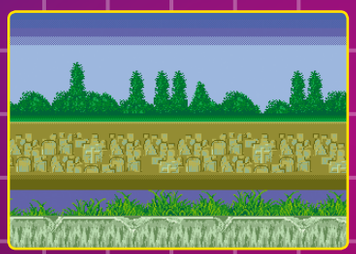
Matt Phillips
Director of Big Evil Corporation

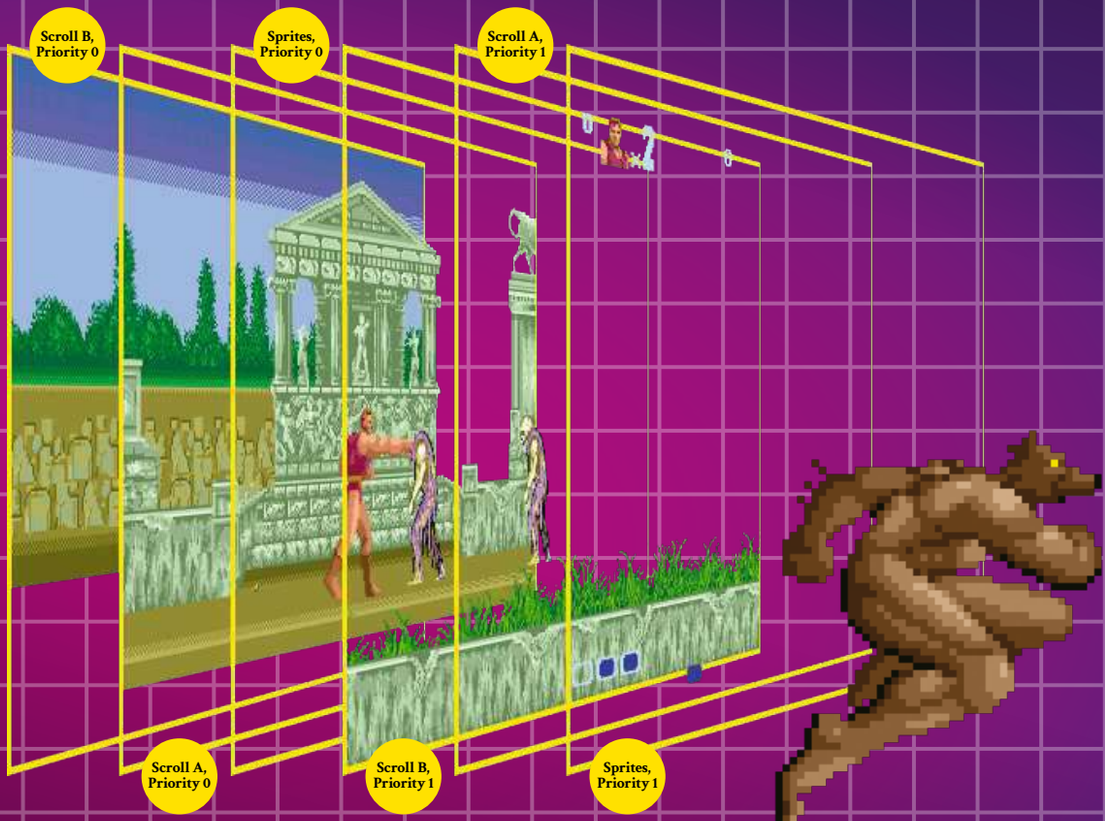
Takashi Iizuka
Game designer (Golden Axe 3, Sonic 3, Sonic & Knuckles)

You've been framed

The Mega Drive's multilayer display was a new feature for consoles – here's the complex process that goes into creating a frame...

01 The Mega Drive VDP draws three graphical layers, named Scroll B, Scroll A and Sprites. The Scroll layers are background tilemaps that can be scrolled in any direction and have limited animation, while the sprite layer is for the in-game objects that need to move around quickly and animate fully. These layers are then passed to the priority controller.





02 The priority controller ensures that items are drawn in the correct order. It starts with a fixed order of Scroll B at the back, Scroll A next and Sprites on top. However, if part of any layer has a priority bit set to 1 instead of 0, it is cut out and placed in front of everything with a lower priority, in the same B/A/Sprites order. Here's how it works:

SCROLL B, PRIORITY 0

■ This is the furthest part of the background, and the slowest moving. Note that the lower part of this layer isn't used because it wouldn't be visible.

SCROLL A, PRIORITY 0

■ The nearer portion of the background is here, and is moved faster than Scroll B in order to create a parallax scrolling effect.

SPRITES, PRIORITY 0

■ This is where the main action happens – your character and the enemies all appear here. This layer has its own priority system, too.

SCROLL B, PRIORITY 1

■ The free space on the lower part of Scroll B has been used to create a foreground, with the priority bit pulling it in front of even the sprites.

SCROLL A, PRIORITY 1

■ Areas not needed to draw the main background have been used for the HUD – although not all of it, curiously.

SPRITES, PRIORITY 1

■ The remainder of the HUD goes here, drawing over the top of everything else.

03 The frame is fully assembled, ready for display. If you're using a 32X, there's an extra layer added before the picture goes to the TV – and the regular Mega Drive graphics can be either overlaid or underlaid, depending on the needs of the game in question.

"I did not care for the NES because of its 8-bit limitations and the draconian licence agreement"

Trip Hawkins

The most significant decision Sega took during the development of the Mega Drive was its choice of CPU. Again in *Collected Works*, Masami Ishikawa notes that this was the most important component choice issue – the hope was to use the popular Motorola 68000 CPU, the 16-bit CPU from which the System 16 gained its name. Introduced as a high-end part in the late Seventies, the processor was in mass use by the late Eighties. The big attractions such as *Hang-On* were using two 68000s per board, but the more economical System 16 board introduced in 1986 used just one.

However, the cost of the chip forced the hardware designers to consider an 8-bit alternative. Even the Atari ST, marketed as offering "power without the price" was over £200 at the time. The Mega Drive's retail price of 21,000 yen was less than half of that, roughly £95 in late 1988. In the Japanese book *Sega Consumer History*, hardware designer Hideki Sato explained that the issue ultimately came down to negotiations with Signetics, which manufactured 68000 CPUs. Sega had asked for a very low price, and eventually secured it for a blanket order of 300,000 chips.

For programmers and engineers, securing this CPU was crucial. Mark Cerny, who had spent much of the late Eighties in Japan programming games for the Master System was also enthusiastic. "It was wonderful to be able to use a 68000 CPU. I'd had some experience with them back when I was making arcade games – for example, *Marble Madness* was based on another member of the 68000 family – and had really been missing the straightforward programming model and high performance."

For Trip Hawkins, founder of Electronic Arts, it was even more important. The company was a leading publisher of computer games, but as prices remained high and manufacturers failed to embrace the consumer market, it became clear that consoles were going to take over the market. The problem was the console market leader. "I did not care for the NES because of its 8-bit limitations and the draconian licence agreement and I also suspected, correctly as it turned out, that Nintendo would milk it for too long and leave the 16-bit door wide open," Trip recalls.

At the time, we felt that Nintendo had really opened a window of opportunities for other platforms by not shipping the Super NES in the US until 1991," Mark agrees. "Console sales peak around Christmas and New Year, and we had two full holiday seasons to show the US audience what the Mega Drive could do before the Super NES ever showed up!" From Mark's perspective within Sega, it makes sense that the Mega Drive would be the best choice to take advantage of the 16-bit open goal. But from the outside, electronics giant NEC and its PC Engine/Turbografx console could have seemed like the safer bet. Trip didn't believe so, though. "I never considered NEC a consumer company and never considered the Turbografx a real 16-bit system," he explains. "From a marketing and software standpoint I knew that NEC had no chance against either Nintendo or Sega."

Ultimately, EA's backing was won on technical grounds. "Sega's design that included the MC-68000 along with separate graphics and sound chips, two joysticks and a price under $200, was exactly what the market needed," asserts Trip. "Way back in 1978 I led Apple's pivot to the office desktop market and was tasked to work with Steve Jobs on the hardware spec for a 16-bit system. We both loved the Motorola MC-68000 and it went into the Lisa and Mac. When I founded EA we bought Sun workstations for our best developers and they also had the 68000," he explains. The CPU perfectly fit the company's focus on home computers, too. "We had extensive experience and an enormous code base for the 68000 and had a great deal of content that also knew how to take advantage of a GPU and sound chip."

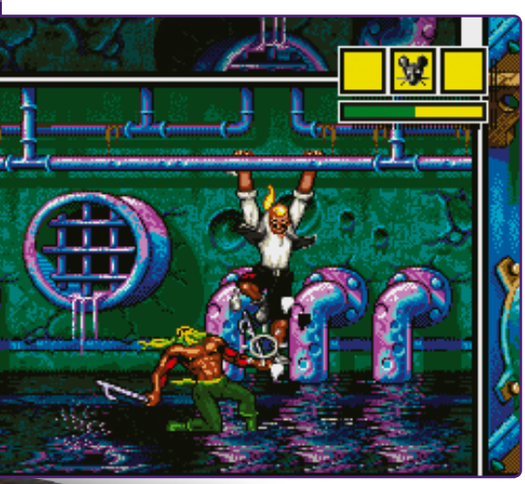
Matt Phillips is a developer with credits including *Homefront: The Revolution* and *Lego City: Undercover*, whose love for his first console has led him to develop the original Mega Drive game *Tanglewood*. "It's relatively very simple compared to the likes of Xbox One and PS4, which is both a curse and a blessing. Coding needs to be done to-the-metal, the machine has no operating system, no device drivers, and if you'd like to squeeze any kind of performance out of its tiny 7MHz CPU then everything needs to be done in raw

MEGA FACT

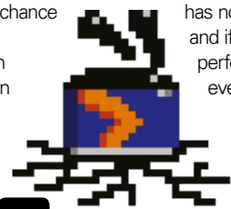
■ The largest official Mega Drive cartridge is *Super Street Fighter II: The New Challengers*, at a whopping 40Mbit (5MB) – over the theoretical 32Mbit maximum.

» Clever use of the Mega Drive's scrolling layers allowed for this giant airship to appear.

» Mastery of the Mega Drive's custom VDP led to cool graphical effects like these light shafts.



» Takashi Iizuka counts *Comix Zone* as one of his favourite Mega Drive games, but has never played the final game.



» American and European copies of Sonic didn't include the line scroll effect Rieko Kodama mentions…

"I was very excited to work on a system which had new features"

Rieko Kodama

▶ assembly language." When asked about the console's strengths, he concurs with those who were there at the time: "The 68000 processor, without a doubt. It was an excellent choice for a games machine of the time, and I still keep finding things about it that impress me even today."

The 68000 CPU was a huge part of what made the Mega Drive work. Its adoption allowed everyone from Japanese arcade coders to European developers to transition to the machine smoothly. What's more, it was a powerhouse for its time – after all, this was a proper arcade CPU in a home console. Though the CPU's fast clock speed has been spun as a major advantage over the SNES and its Ricoh 5A22 CPU, the truth is that the two machines process a similar number of instructions per second – but that in itself is impressive, given that the SNES arrived two whole years later. However, the 68000 did possess real speed advantages in the form of a wider data bus, faster memory bandwidth and faster arithmetic performance.

While the CPU benefited from familiarity, Sega created a custom visual display processor (VDP) for graphics, an evolution of the Master System's VDP. "I was very excited to work on a system which had new features. I remember when I saw the Mega Drive board for the first time, this was before it was made more compact, it was bigger than the table," remembers Rieko Kodama, a veteran artist whose graphics appear in Mega

» …the Japanese game uses it to create wavy distortions that convey the feeling of being underwater.

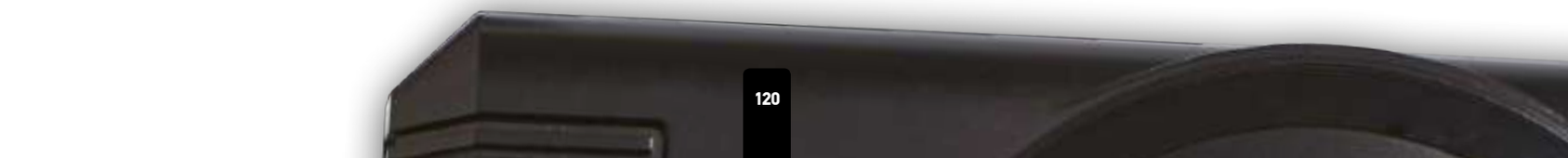
» Matt Phillips is creating a brand-new Mega Drive game, *Tanglewood*, using old-school techniques and hardware.

Drive games such as *Altered Beast*, *Sonic The Hedgehog* and *Phantasy Star IV*. "The most exciting feature for me was the enhanced colour variation. I'd imagined that it would be much easier to draw three-dimensional objects now, which was difficult on the Mark III/Master System." That may sound odd to readers who know that the Mega Drive's colour capabilities are relatively weak, but as Kodama points out, it was still an upgrade: "It was limited, but I can't complain compared to the number of colours with the Mark III and Master System."

The Mega Drive didn't just show more colours than the Master System. Its display resolution was 45% higher, it could display up to 80 sprites, and it had four times the graphic RAM, allowing for more unique tiles to be held in data. The Mega Drive could also display two background layers alongside sprites, and was capable of manipulating them with a priority system and line scrolling for further complexity. "It became possible to show depth," says Kodama. "With two-layer scrolling and rastering and so on, we were able to create roads with depth in driving games, or show floating under water. Talking about my work, the Labyrinth Zone in *Sonic The Hedgehog* used these features. I think we were able to add a little more weight to Sonic's movements. I hope you've enjoyed the underwater action and the atmosphere of the labyrinth."

For Matt, the Mega Drive's graphical capabilities have been a constant thorn in the side. "The small video memory has been the project's Achilles' heel. What makes it worse is that the machine was originally designed to support twice the amount – the graphics chip supports 128KB of VRAM," he says. "I believe it was cut for cost reasons, and I think that was a big mistake." This was a decision made late in the hardware design process – the larger capacity had been experimented with, but the benefits were felt to be merely incremental gains. It's also worth noting that by mid-1988, a RAM shortage caused prices to quadruple since the beginning of the year."Another issue is its very limited palette size," Matt continues. "It can only display 61 colours at a time (excluding a shadow mode and some hardcore tricks). Thankfully I've been working with artists who have managed to squeeze the very best out of so little, but it's not been easy."

The actual process of creating art for the Mega Drive varied from company to company. At Sega's internal studios, the increased artistic demands changed the development process. "Compared to the Mark III/Master System days, we certainly increased development time and design staff. As ROM capacity increased, so did the work for the designers," recalls Kodama. "However, we now had less pressure with the number of colours and how to draw the objects, since we had more leeway from an artistic point of view due to the evolution of the new system." Artists at Sega used a custom workstation known as the Sega Digitizer System. This hardware, which had evolved through the SG-1000 and Master System generations, consisted of a graphic tablet and a puck, a light pen for working with the screen, and two CRT monitors.



» Electronic Arts was a prolific Mega Drive publisher, and built much of its sports empire on the console.

Third-party studios used a variety of solutions, with Deluxe Paint on the Amiga proving particularly common amongst Western devs.

On the audio front, Sega opted for the YM2612 FM synthesis chip from Yamaha, noting in its development manual that it resembled the YM2151 chip used in its arcade games. An 8-bit Z80 CPU was included to drive this chip, which had the dual effect of replicating the System 16 set-up and enabling Master System compatibility. The chip provided six channels of FM sound, a low frequency oscillator to distort those sounds, and the capability to replace one of those channels with a channel for 8-bit digitised audio – often used for speech effects or sampled instruments. That was two fewer channels than the YM2151, and was no big deal compared to what was available in the computer market as any fan of the Amiga's Paula sound chip will tell you. However, this was still a huge advance for console sound. Bear in mind that Sega had ▶

MEGA FACT

■ In South Korea the Mega Drive was officially marketed by Samsung, under the names Super Gam*Boy and later Super Aladdin Boy.

Graphic scenes

Getting the best visuals from the system required artistry, programming and smart hardware use

DITHERING

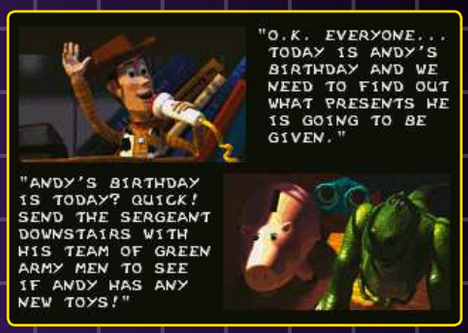
■ Thanks to the blurry RF and composite connections frequently used during the late Eighties and Early Nineties, nearby pixels would blend together on a TV set to create new colours and transparency effects. Artists used this technique on many consoles, but the Mega Drive's relatively limited colour palette meant it was employed especially frequently.

LINE SCROLL

■ The Mega Drive's graphics hardware can scroll individual parts of a single layer at different speeds. This can be used to create all kinds of unique effects – racing games use it for curves in the road, *Street Fighter II* uses it to add perspective to the ground, *Sonic 2* simulates additional background layers and *Rocket Knight Adventures* uses it for heat distortion.

SHADOW/HIGHLIGHT

■ This hardware feature enabled the brightness of on-screen colours to be modified, and was most often used to create transparent lighting effects, as seen in *Ristar*, *Vectorman* and *Ranger-X*. Because this produces shades outside of the normal Mega Drive palette, it allows developers to break the 64-colour limit – this *Toy Story* cutscene achieves 163 colours.


"O.K. EVERYONE... TODAY IS ANDY'S BIRTHDAY AND WE NEED TO FIND OUT WHAT PRESENTS HE IS GOING TO BE GIVEN."
"ANDY'S BIRTHDAY IS TODAY? QUICK! SEND THE SERGEANT DOWNSTAIRS WITH HIS TEAM OF GREEN ARMY MEN TO SEE IF ANDY HAS ANY NEW TOYS!"

SCALING

■ The Atari Lynx and Neo-Geo had the ability to scale sprites built into their hardware, and the SNES could scale and rotate a background layer, but the Mega Drive had no such hardware function. However, the machine was in fact capable of producing scaling effects with clever software programming – this image from *Skitchin'* is just one example of that.

POLYGONS

■ Although the Mega Drive didn't have dedicated 3D hardware, the console was capable of producing a limited number of filled polygons using software alone. This was commonly used in flight simulators, as well as a limited number of racing games. *Virtua Racing* doesn't count though, as it used the Sega Virtua Processor enhancement chip.

Under the hood

Take a peek at the chips that power your 16-bit dreams

MOTOROLA 68000

■ This is the main processor for the Mega Drive, a 16-bit CPU that had been a staple of Sega's arcade games since 1985.

RAM

■ Two 32KB chips supply the Mega Drive's memory. RAM prices and availability were volatile in 1988, so the PCB is designed to accommodate both wide and narrow chips to hedge against shortages.

ZILOG Z80

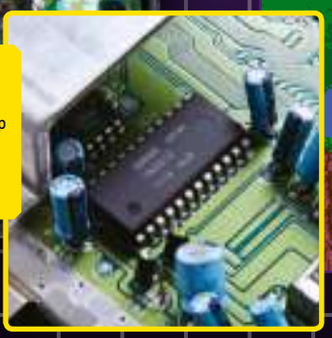
■ This 8-bit CPU is included as a sound coprocessor, though not every game actually uses it. This chip's inclusion is crucial for providing backwards compatibility with Master System games.

SEGA 315-5313

■ This is the visual display processor – the graphical heart of the Mega Drive, which handles two scrolling background layers plus sprites.

YAMAHA YM2612

■ This is the sound synthesiser chip used by Mega Drive games, providing up to six channels of FM sound. Sampled PCM sounds are also supported, for effects such as drum beats and speech.



» Konami was one of the many publishers that took a few years to hop on the Mega Drive bandwagon.

▶ only adopted FM sound chips in any capacity in 1985, and the FM sound add-on for the Master System (released in 1987) cost more than any standard game for the console.

Two dominant sound engines emerged for the Mega Drive. Sega developed SMPS in Japan, which was compatible with both the Z80 and 68000 but required composers to essentially be programmers as well. Sega's American branch had GEMS (Genesis Editor for Music And Sound Effects) developed, which supported a sequencer setup that was much easier on composers. This became used in many non-Japanese games. However, many third parties chose to use their own sound engines – Krisalis wrote a popular engine licensed to a number of developers, EA and Accolade both created their own tools, and Namco and Konami did the same in Japan.

The Mega Drive was designed for a range of connection options, most of which were previewed but never reached the market. These include a graphics tablet, a keyboard, a printer and a floppy disk drive. The one that mattered the most was the control pad. This went through a variety of designs, but all sketches included two major features – a three-button layout which took after the arcade JAMMA standard, and a curved design, quite unlike most official pads beforehand. This enabled designers to implement greater control complexity than in other console games, but it wouldn't suffice for the entire generation and a six-button model was introduced in 1993.

» American development studios like Sega Technical Institute were essential to satisfy demand for games.

» *Landstalker*'s isometric visuals were remarkable to Rieko Kodama back in the Nineties.

MEGA FACT

■ Because the Mega Drive removed SG-1000 graphics modes, it can't run the Master System game *F-16 Fighting Falcon* – even with a Power Base Converter.

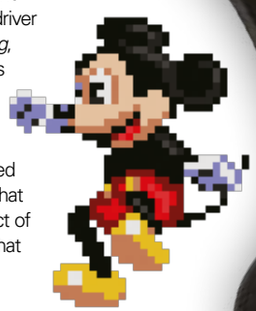
"The biggest early driver of hardware sales was Sonic"

Mark Cerny

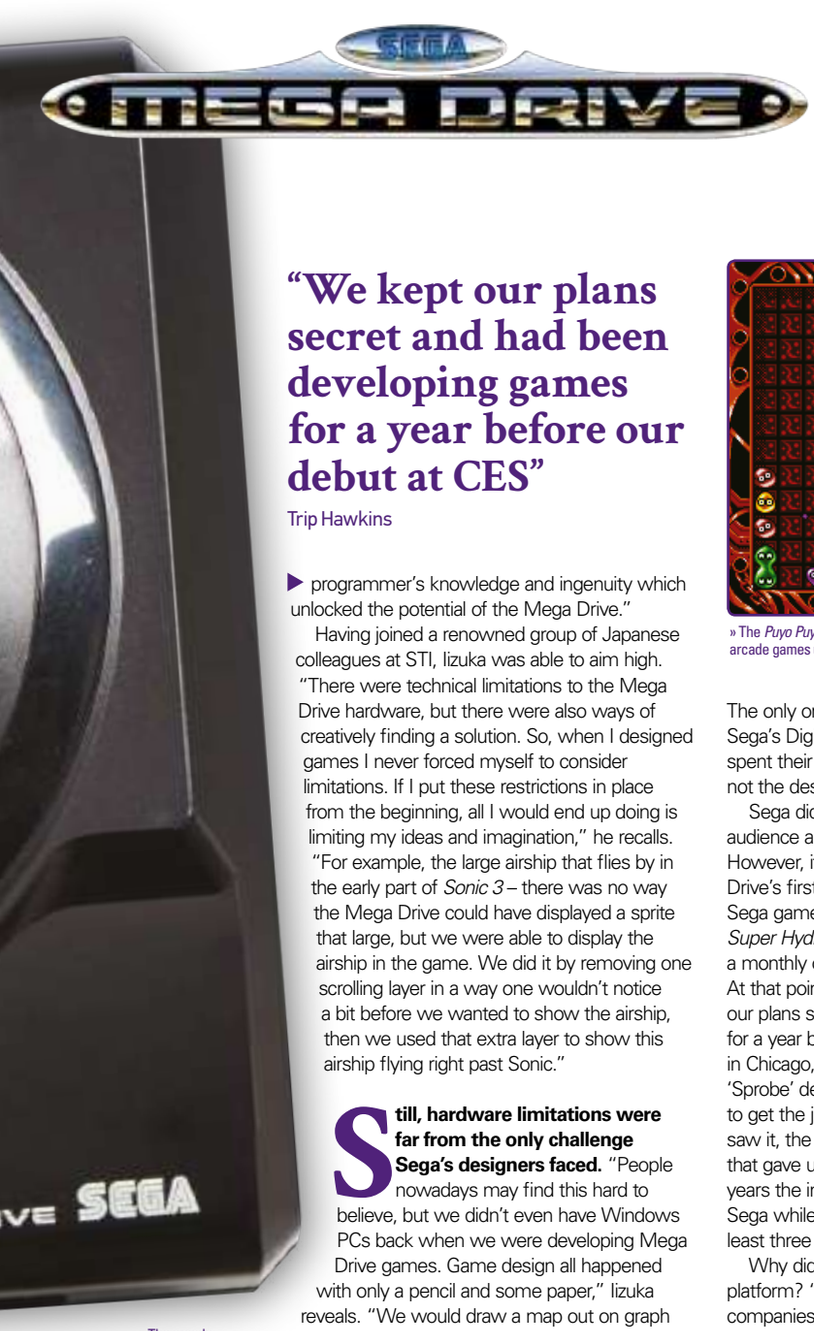
But for all of the Mega Drive's technical capabilities, the system is nothing without its games. "The software sells the hardware – if there are no good games then of course the console will not be a success," Mark reminds us. Though Sega would still develop many games in Japan, one of Sega Of America's major innovations was to establish local development studios to better cater for non-Japanese tastes, which would prove to be vital as the machine was vastly more popular outside of Japan.

Japanese designers were aware of the Mega Drive's international success, but continued to work as normal. "I felt its popularity in the West when I heard about *Sonic*'s very good sales. At the time, I also heard that *Phantasy Star* was more popular in the West than in Japan," says Kodama. "That didn't have any particular influence on our design choices, but for creatures such as dragons that appear in RPGs, I bought and referred to illustration compilations from *Dungeons & Dragons* to HR Giger. So, you could say in general I was affected by Western illustrations and design."

Mark was at the forefront of the American development charge as he set up the Sega Technical Institute, which would go on to produce games including *Kid Chameleon*, *Sonic The Hedgehog 2* and *Comix Zone*. Other American studios included Sega Interactive and Sega Midwest Studio, and Sega would often contract external studios including BlueSky Software. Interestingly, despite having developed recognisable games, Mark remains unsure of the significance of the US-based teams in the Mega Drive's success. "The biggest early driver of hardware sales was *Sonic The Hedgehog*, which was developed at Sega headquarters in Japan," he explains, indicating a preference for the killer app theory. "The Sega Technical Institute and other US-based teams did some later work and helped keep the momentum going, but I suspect that the apart from the *Sonic* sequels, the impact of our efforts was pretty minor compared to that initial push."



Takashi Iizuka would work on both sides of the Pacific. "The first game I participated in development on was *Golden Axe III*, but I was there more for help and everything was such a new experience to me that nothing really felt 'difficult' to me," explains the game designer, who joined Sega straight out of university. "I did learn many of the limitations of the hardware while working on that title, from not being able to display a lot of sprites on screen, or having only two scrolling layers, or not being able to expand or shrink things," he recalls. "Shortly after that, during the development of *Sonic 3* I learned that all of the limitations can be addressed through the ▶



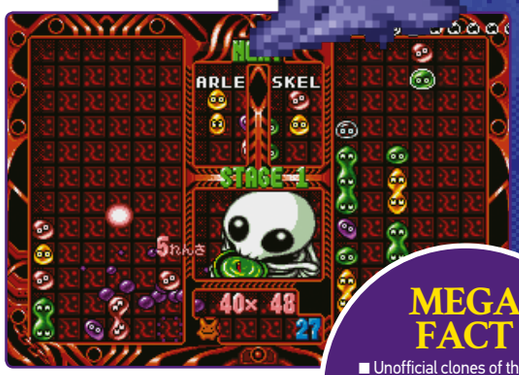
> "We kept our plans secret and had been developing games for a year before our debut at CES"
>
> Trip Hawkins

programmer's knowledge and ingenuity which unlocked the potential of the Mega Drive."

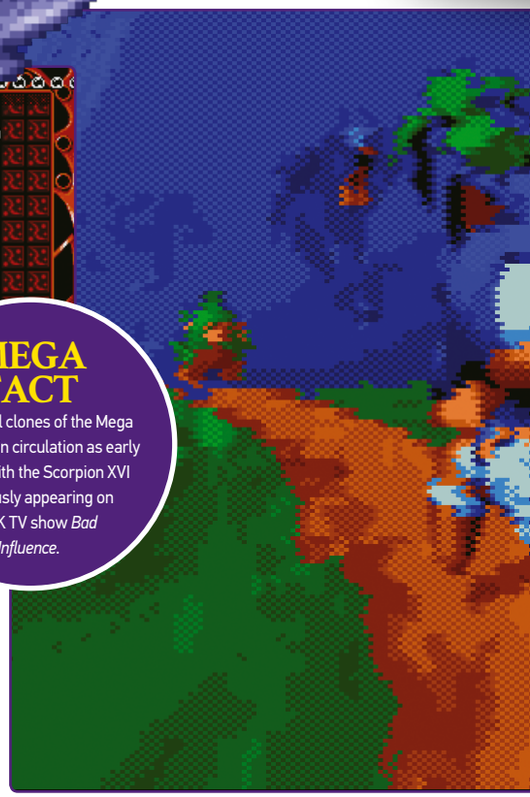
Having joined a renowned group of Japanese colleagues at STI, Iizuka was able to aim high. "There were technical limitations to the Mega Drive hardware, but there were also ways of creatively finding a solution. So, when I designed games I never forced myself to consider limitations. If I put these restrictions in place from the beginning, all I would end up doing is limiting my ideas and imagination," he recalls. "For example, the large airship that flies by in the early part of *Sonic 3* – there was no way the Mega Drive could have displayed a sprite that large, but we were able to display the airship in the game. We did it by removing one scrolling layer in a way one wouldn't notice a bit before we wanted to show the airship, then we used that extra layer to show this airship flying right past Sonic."

Still, hardware limitations were far from the only challenge Sega's designers faced. "People nowadays may find this hard to believe, but we didn't even have Windows PCs back when we were developing Mega Drive games. Game design all happened with only a pencil and some paper," Iizuka reveals. "We would draw a map out on graph paper all taped together, then match up the desired map design with the boxes on the graph paper and try and mentally simulate how that would look when digitized for display on a screen.

» The arcade board that ran *Golden Axe* used the same CPU as the Mega Drive did, albeit at a faster speed.



» The *Puyo Puyo* games were easily ported as the arcade games used Mega Drive tech.



MEGA FACT

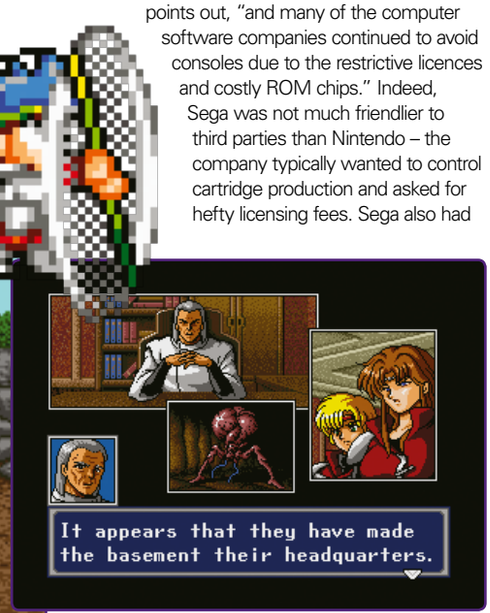
■ Unofficial clones of the Mega Drive were in circulation as early as 1993, with the Scorpion XVI infamously appearing on the UK TV show *Bad Influence*.

The only ones who had access to Sega's Digitizer were the artists who spent their days drawing pixel by pixel, not the designers."

Sega didn't have the means to satisfy a mass audience alone, so third-party support was crucial. However, it was slow to arrive. By the Mega Drive's first anniversary in 1989, the only non-Sega games in Japan were *Thunder Force II* and *Super Hydlide*. Third-party releases didn't become a monthly occurrence until the middle of 1990. At that point, EA would show its hand. "We kept our plans secret and had been developing games for a year before our debut at the June 1990 CES in Chicago," recalls Trip. EA's reverse-engineered 'Sprobe' development kit enabled the company to get the jump on the competition – but as Trip saw it, the competition wasn't fierce. "In theory, that gave us a one-year lead; but for the next two years the industry continued to be sceptical about Sega while I was forcing my producers to start at least three new Sega games every month."

Why did teams shy away from the growing platform? "Of course, all console software companies were counting on Nintendo," Trip points out, "and many of the computer software companies continued to avoid consoles due to the restrictive licences and costly ROM chips." Indeed, Sega was not much friendlier to third parties than Nintendo – the company typically wanted to control cartridge production and asked for hefty licensing fees. Sega also had a set of guidelines that prohibited certain themes. As a result, many companies were late entrants into the market.

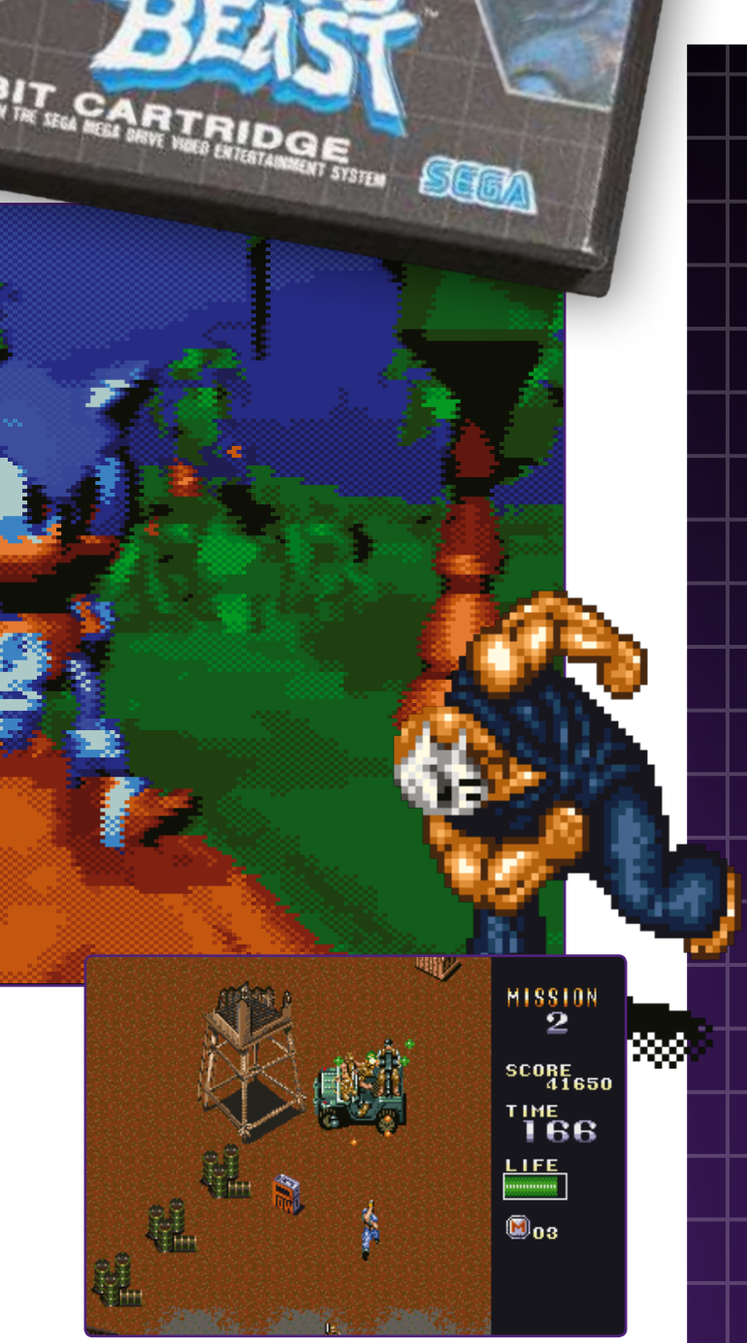
EA's demonstration of its ability to create Mega Drive games without a licence earned it major exemptions. "We were not subject to any of Sega's rules, most of which they had copied from Nintendo. We were entirely outside their program, doing our own thing – we only had to take care in the use of their trademarks in our marketing materials," Trip explains. EA was able to manufacture its own cartridges (with distinctive yellow tabs) and get around concept approvals, and the company would go on to publish over 100 Mega Drive games between 1990 and 1997. Other companies would eventually get their own deals along these lines – Acclaim and Konami had their own cartridges that followed Sega's specs, while the likes of Accolade and Codemasters created cartridges with distinctive shapes.



» Amongst her own games, Rieko Kodama counts *Altered Beast* and *Phantasy Star IV* as favourites.

With hundreds of games having been developed for the Mega Drive, we're curious to know which games caught the eyes of the developers. While Matt cites Mark Cerny and Yuji Naka as programming heroes, it's a UK development that awes him. "A game that has stuck in my mind is *Sonic 3D*, for its FMV running from cartridge," he explains. "I've been exposed to the delights of ROM access times, and the glitches and lockups caused by trying to stream data from the cartridge too fast. I've since learned of the tricks they used to stream that FMV, and it only makes it more impressive."

Iizuka didn't have to look far to find something impressive. "At the time I was working on *Sonic 3* with other Japanese



» In lieu of early third-party support, Sega would license games from Capcom for conversion to the Mega Drive.

staff at Sega Of America, and in the room next to ours the American staff were working on *Comix Zone*. I thought the idea of having an action game happen within the frame of an American-style comic was fresh and interesting. I played the game a lot when it was in mid-development, but I have never played the final retail version of the game." Kodama's favourite came from Climax Entertainment. "I remember that I was so surprised to see *Landstalker* for the first time," she tells us. "Its pseudo 3D graphics with the quarter view was so unique and the background art and character art was fantastic."

It's fascinating to look back at the design choices that shaped one of the defining consoles of the era. But the truth is that the Mega Drive is so much more than a black box of chips. "Certainly a lot of the nostalgia derives from the software library, but that's not all, Sega crafted such a fun brand image as well! Remember WELCO METOT HENEX TLEVEL? I certainly do," Mark reminisces. "Hard not to smile when you think back to those days." Indeed, three decades on, the Mega Drive still makes us smile – and as non-developers, that doesn't take a 68000 CPU. ✱

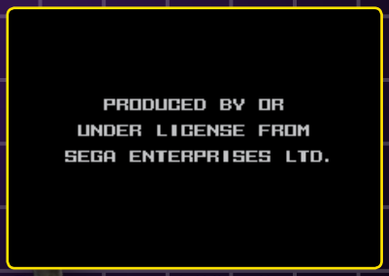
Liberty vs security

Security was one of the most controversial aspects of the Mega Drive – here's how one third party broke through it

One of the interesting things about the Mega Drive is its security system. Mega Drive consoles featuring the Trademark Security System (TMSS) expect to read the word 'Sega' at a specific ROM address, and the word also must be written to a designated RAM address before the VDP can be accessed. If these conditions are met, the system will display a message stating that the game was "Produced by or under license from Sega Enterprises Ltd" Originally, this was intended as a region locking measure – developer manuals referred to it as the "US security code" and early Japanese games were not designed to pass the check. This didn't matter to begin with, as early consoles didn't implement the check.

However, third parties wanted to develop for the Mega Drive without agreeing to the costly official licensing terms. Electronic Arts was one of those, and had reverse-engineered the console – with Trip Hawkins confident that EA would win if Sega tried to sue. "I had great lawyers and took the law very seriously. We understood how to correctly manage a clean room to avoid copyright infringement," he explains. "We waited patiently to confirm that the Genesis that debuted in the US in 1989 and as the Mega Drive in Europe in 1990 did not make any changes to the Japanese version that we had figured out. By comparison, while we also reverse-engineered the NES, we did not release any games based on this work because we could not find a way around the patented NES security chip."

Ultimately, this wasn't a fight that EA had, as its reverse-engineering earned the company a preferential licensing deal. However, Accolade took the unlicensed route when it released *Ishido: The Way Of Stones* and incurred Sega's wrath. "I was not surprised by Accolade's approach but



» The screen you were greeted with if everything was working correctly.

» It was Accolade's *Ishido: The Way Of The Stones* that caught Sega's eye and provoked a legal case.

when I went to visit them and compare notes I learned that they lacked legal sophistication," Trip remembers. "I gave them some advice and offered to collaborate but they went their own way." Sega implemented the TMSS check in newly manufactured Mega Drives, and Accolade coded its next releases to pass the check.

Sega launched a series of legal actions in response, alleging unfair competition, copyright infringement for using the TMSS code, and trademark infringement because Accolade's games triggered a message stating that they were licensed by Sega. Accolade filed a counterclaim, alleging that Sega's TMSS screen falsified the source of its games. Judge Barbara A Caulfield initially ruled in favour of Sega, dismissing Accolade's argument of fair use due as its games were made for profit and competed in the marketplace with Sega's games. However, the decision was appealed. Judge Stephen Reinhardt overturned the earlier verdict, noting that non-expressive functional principles are not protected under US copyright law and that the TMSS code was required for a game to function. Any trademark infringement was considered to be inadvertently triggered by this fair use act, and that Sega was at fault for designing a system that would falsely label the product.

Sega was dissatisfied with the outcome and petitioned for a rehearing, but ultimately the two sides settled under undisclosed terms in April 1993, bringing a year and a half of legal wrangling to an end. Accolade became a licensed Mega Drive developer, TMSS remained in Mega Drive systems, and a more specific method of region locking was ultimately implemented.

BOY WONDER

A GAME BOY RETROSPECTIVE

It's been nearly 30 years since the world first glimpsed the Game Boy, the creation of veteran designer Gunpei Yokoi and his team at Nintendo. To celebrate, Retro Gamer looks back at that most modest of handhelds and finds out what made it such a massive success

It's often said that there are no surprises in gaming anymore. In this connected age we now know everything, instantly. The days of walking into a shop and being blindsided by new gaming hardware and software are dead and gone.

But things haven't really changed that much. It was just less immediate in the past, with gamers having to rely on magazines drip-feeding information about exciting new products. This was certainly the case with the Game Boy, the Nintendo handheld that launched in Japan in April 1989 and the US shortly after but wouldn't arrive in Europe until September 1990. The long-running and respected UK magazine *Computer & Video Games* dropped the first details in its May 1989 issue, calling Nintendo's new machine a "micro-marvel". There was a product image too, allowing readers to scrutinise its key characteristics: the D-pad and button configuration, the grey-coloured shell, the yellowy-green screen. Displayed on the screen was a little something called *Super Mario Land*.

It wasn't possible to judge the size however. There were no hands gripping the Game Boy for comparison. All was revealed in the July 1989 issue of *C&VG* when deputy editor Julian Rignall got his own hands on a Japanese Game Boy for an import review. "There's a new Nintendo console in town," wrote Jaz. "It fits comfortably in the palm of your hand, has its own tiny TV screen, and the games come on cartridges the size of a matchbox. Sounds too good to be true?"

Happily Jaz revealed that the Game Boy was not just real but rather quite brilliant. "The console fits in your hand perfectly," he remarked. "Playing games on it is a joy!" While he praised the sharpness of the graphics on the LCD screen, he did note blurry scrolling as a caveat. It was revealed that the handheld was powered by four AA batteries, but no mention of how many hours of play they offered (clearly Jaz wasn't changing them often enough for it to be regarded as an issue). Meanwhile, key Japanese launch title *Super Mario Land* was described as "unbelievably addictive". The review ended with some impressive sales claims from Japan – 500,000 units sold to date, with 300,000 snapped up at launch. Elsewhere in the issue the Game Boy was called "The future of handheld gaming". As Jaz's review was a UK exclusive you could forgive *C&VG* for laying it on thick, yet that statement would turn out to be beautifully prophetic. ▶

OFF-ON
DOT MATRIX WITH STEREO SOUND
SCORE
377
LEVEL
6
LINES
1
BATTERY
Nintendo GAME BOY™
B
SELECT
START
PHONES

> **"I found the Game Boy to be a very simple and easy machine to code for"**
> R-Type II programmer Bob Pape

When the Game Boy finally arrived in Europe, almost 18 months after its Japanese debut, there were just half-a-dozen games released alongside it. Of these, *Super Mario Land*, *Tennis* and *Golf* were the must-have titles. One title you didn't have to buy was the revelatory Game Boy version of *Tetris* as it came bundled with the console. This smart move had worked wonders for Nintendo in the US, leading to stellar sales (a reported million units were sold within weeks of its launch). European gamers could now dream of falling blocks too as *Tetris* fever took hold. It really was the perfect pack-in – the ultimate game on the go.

The success of the hardware quickly led to flood of fresh software that identified the Game Boy as a diminutive yet capable contender that could punch above its weight (which was a lean 300g including batteries, if you were wondering). In its first couple of years the handheld was home to some fantastic original titles such as pinball sim *Revenge Of The 'Gator*, platform adventure *Gargoyle's Quest*, and the Game Boy exclusive sequel *Metroid II: Return Of Samus*. There was also plenty of decent and undeniably attractive licensed fare like *Teenage Mutant Ninja Turtles*, *RoboCop* and *Batman*. Coin-ops were converted too with varying results, as you might expect, although *Double Dragon*, *Nemesis* and *R-Type* were all admirable attempts.

The Game Boy's custom processor, which was essentially a Z80 with some bits missing and others added, ensured that many programmers could move over to the machine with little problem. Bob Pape, who coded the celebrated Spectrum version of *R-Type*, went on to develop *R-Type II* for the handheld. "I found the Game Boy to be a very simple and easy machine to code for," he says. "The hardware of course had limitations but then that was the same for all early 8-bit consoles and computers. Some people may have had problems dealing with the limited instruction set of the custom Sharp processor that the Game Boy used, compared to the Z80, but I think for those programmers who were used to having to scratch for every last byte out of a 1K ZX81 or 48K Spectrum through tight coding then it was almost like coming home."

In the past Nintendo has been accused of providing developers with vague or incomplete documentation, but in Bob's experience this wasn't too much of an issue as the hardware was pretty much an open book. "Well if you don't know what's missing then you can't say it's not there!" he comments. "It's more likely that certain coding techniques were kept quiet to give companies an edge, things like how to multiplex the sprites or give the appearance of seven shades of grey. Other ways of programming the hardware were so obvious they didn't need documenting."

Another Z80 developer who gladly moved over to the Game Boy was Ken Murfitt. "In many ways the Game Boy was easier to program that the other Z80 platforms," says Ken, who came chiefly from a Amstrad CPC background and developed *Double Dragon 3* and *The Lawnmower Man* for the Game

» You won't get very far without using these.

MUSCIAL INTERLUDE

Jonathan Dunn composed for many Game Boy titles, including the RoboCop theme used on that washing machine advert…

» Music man Jonathan Dunn.

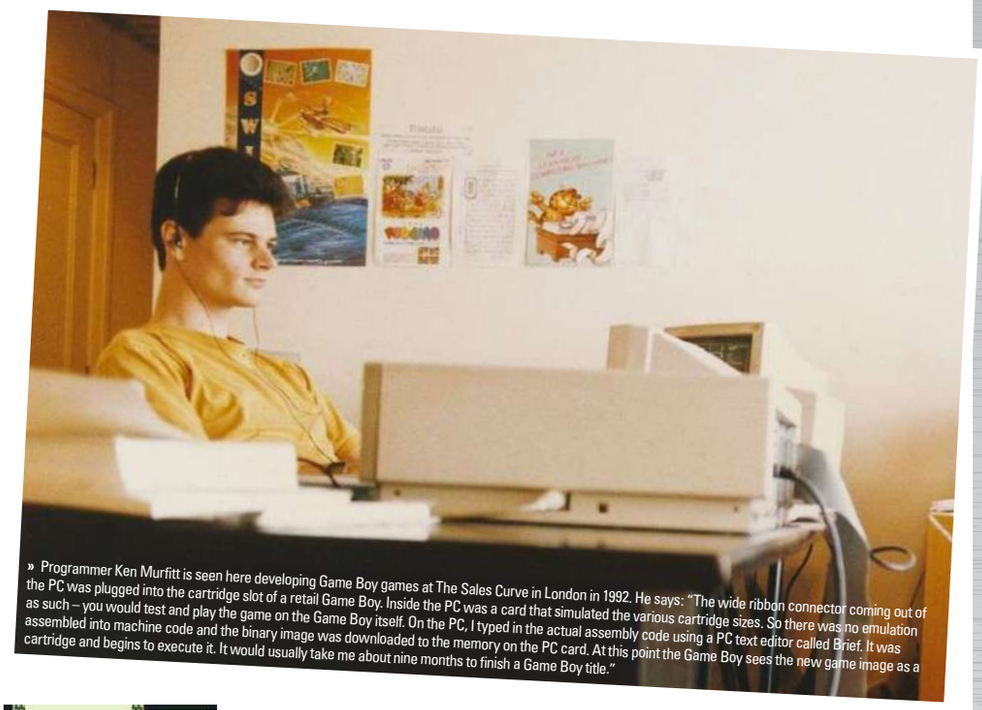
What were your immediate thoughts on the Game Boy as a gaming platform?
When I first tried a Game Boy I thought it was a great little device. Of course the first thing I played was *Tetris* and I was hooked. I also remember that you could connect two Game Boys together and play two-player *Tetris*. That was the first time I'd seen anything like that.

How would you rate the Game Boy's audio capabilities?
The Game Boy had some interesting characteristics. It had a waveform that you could program yourself – 32 4-bit samples that you could define. I remember getting it to make some unusual noises. I also liked the fact that you had some control of stereo placement, though I wish I'd used that a bit more in the work I did. Quite often the stuff I did for the Game Boy was a port from another version so I didn't get to spend enough time experimenting with the possibilities.

» *RoboCop*. Great game, superb soundtrack.

Did you encounter any technical challenges at all?
I coded my own driver for the C64 and NES and SNES, but at the time didn't have enough knowledge of Z80 to do the audio driver that we needed. So Ocean's John Brandwood was roped in to convert the Spectrum driver, with a few modifications. I wasn't happy with the hardware volume envelopes, so I got John to add a more versatile software envelope system that gave me more accurate control. It had disadvantages as we effectively reduced the bit resolution of the volume, but it did allow me to sync the envelopes with other note-based events.

Your *RoboCop* title theme is still used and sampled to this day.



» Programmer Ken Murfitt is seen here developing Game Boy games at The Sales Curve in London in 1992. He says: "The wide ribbon connector coming out of the PC was plugged into the cartridge slot of a retail Game Boy. Inside the PC was a card that simulated the various cartridge sizes. So there was no emulation as such – you would test and play the game on the Game Boy itself. On the PC, I typed in the actual assembly code using a PC text editor called Brief. It was assembled into machine code and the binary image was downloaded to the memory on the PC card. At this point the Game Boy sees the new game image as a cartridge and begins to execute it. It would usually take me about nine months to finish a Game Boy title."

» *Tetris* was the Game Boy's killer app. It was the perfect fit for Nintendo's new handheld.

» *Tetris* went on to sell millions, benefiting nicely from being a pack-in title.

Boy on behalf of The Sales Curve. "It was exciting to use real sprite and background-scrolling hardware, after so many years of squeezing every last instruction out of platforms like the CPC and Spectrum. No more pre-shifted sprites that hog memory, sprite masking or the Z80 stack tricks required to perform background scrolling. You could just set up the sprite buffers one time and scrolling hardware registers once per frame and go. Obviously it was a step backwards in terms of colour count – there were four levels of grey against the Amstrad's palette of 27 colours. You could get in-between greys using flickering but it was visually distracting and so I preferred dithering."

So developing for the Game Boy wasn't particularly difficult for seasoned programmers, but Ken notes there were a couple of unexpected considerations. "The first was battery life. The processor was put to sleep using the HALT or STOP command after processing had been completed for a frame, and this would minimise battery drain until the next vertical blank, 60 times per second. It was surprising to me at the time that the battery life could be extended by saving power during these tiny slices of CPU down time."

And then there was the odd entity known as 'Version Zero Game Boy'. Ken explains: "There were these early production Game Boys of which only a few thousand units existed in the world and Nintendo insisted that any submitted title must run perfectly ▶

Does its continued popularity ever surprise you?

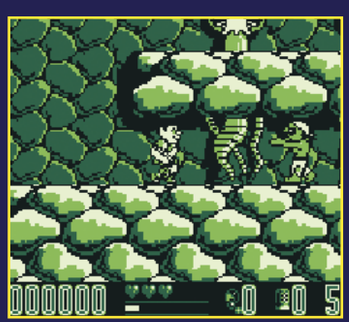
I don't think anyone could have guessed that the *RoboCop* theme would become so memorable. At the time it was just another game. It was the norm to produce stuff very quickly and there was always another project looming at Ocean, so you didn't really get time to think about it. If I look back at all the different versions of the same piece of music I had to do, I wonder how I did it. That tune in particular has been sampled a lot and it's great that it's still around.

Do you receive any payment when the *RoboCop* tune is used?

I now collect writer royalties whenever the track is used, though I didn't receive anything when it was used in the Ariston advert. I think Ocean thought it was just getting some free PR and marketing.

What are you up to these days?

For the last two years I've been living in Slovenia working as COO for a games company called IBZooT. I'm also the co-founder of Fatleg Games, a mobile games start-up. I still code, I still write music. It's fun to make small games for mobile. It feels a little like it did in the old days. You don't need massive teams to produce something fun.



» *Hook* was another Game Boy game that benefited from Jonathan's music.

» Not just any old Game Boy. This one, owned by **RG**'s Paul Drury, is signed by Alexey Pajitnov.

GAME BOY BOLT-ONS

Some of the not-so-silly accessories you could buy for your Game Boy

BATTERY PACK

■ Not the most exciting accessory, or most essential seeing as the Game Boy was the least power-hungry handheld. But when your AAs did finally give up, this add-on was good for up to ten hours of extra play. And if you were more likely to be found playing Game Boy at home, it also doubled as a handy AC adapter.

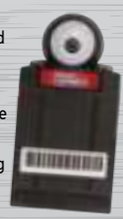
GAME LIGHT

■ The Game Boy was unplayable in low-light conditions so there was no shortage of third-party add-ons designed to brighten up the display. The Game Light from Nubi was one such solution that bolted on to the front of the screen. It required four AAs batteries so it was probably cheaper to find a decent light source instead.

AMPLIFIER

■ Another accessory from Nubi, this device plugged into the headphone socket at the bottom of the Game Boy and boosted the audio output. Sound was louder and also in stereo. With so many ridiculous-looking add-ons available for the Game Boy, this one deserved points for at least trying to match the Game Boy's style and form.

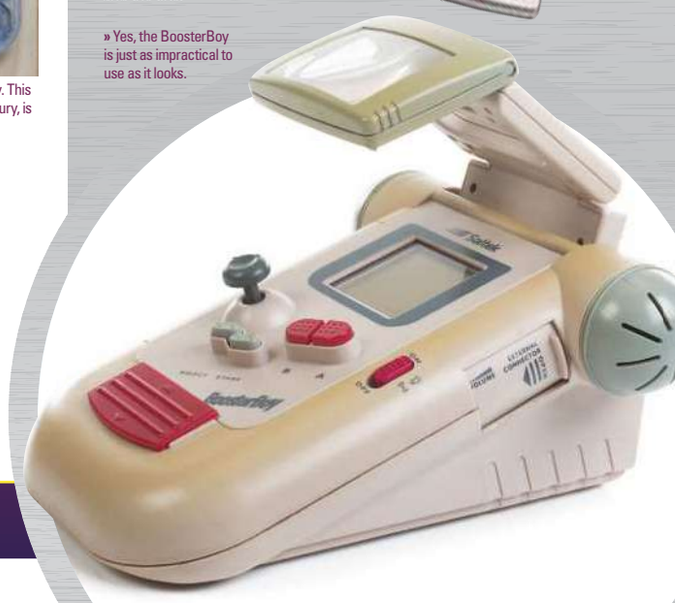
GB CAMERA



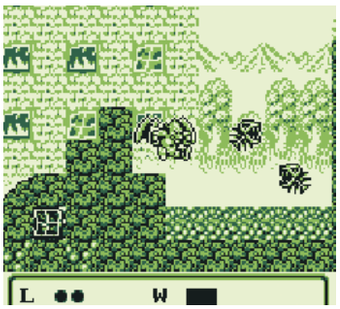
■ This quirky add-on was released in 1998 and turned the Game Boy into a compact digital camera (shortly before digital cameras became commonplace). In addition to snapping and reviewing photos, there were a number of built-in 'games' that would feature the player's grinning mug. They were borderline terrifying in all honesty.

GB PRINTER

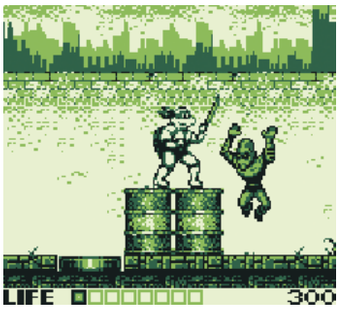
■ If you had a burning desire to print the grainy, black and white photos you'd taken using the GB Camera then you clearly coveted this tiny thermal printer. Otherwise, a bunch of games supported the device, allowing you to print out high scores, screenshots and the like.



» Yes, the BoosterBoy is just as impractical to use as it looks.



» Capcom's *Gargoyle's Quest* was a fun spin-off from arcade hit *Ghosts 'N' Goblins*.



» If there was a craze then it was all over the Game Boy. There were three *Turtles* games in total.

» If you want to play multiplayer games or use peripherals you'll need this port.

> **"Nintendo created games that worked well on a small screen with no colour"**
>
> Graphics artist Elliot Curtis

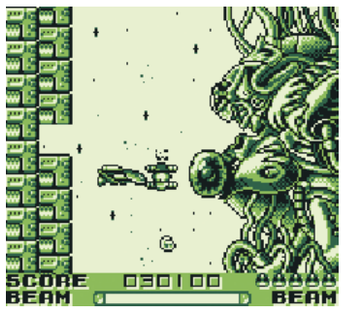
▶ on them. The difference was that the video memory was slightly slower in some respect and problems would be apparent with partially scrambled background tiles appearing in your game due to memory contention. It was a shame because it further restricted how many background blocks you could update during the video blank.

Due to the Game Boy's small screen and limited colour palette, it was the job of artists to ensure that the graphics, and in particular sprites, were as clear and defined as possible. It was a challenge that Elliot Curtis relished. Working for Tiertex Design Studios, he created Game Boy graphics for various Disney licences and *FIFA* entries. "To be offered the chance to make games on a console was a dream," he says. "Yes the Game Boy was limited but the other consoles at the time were actually a bigger struggle to create graphics for. The first time you created a sprite and saw it running on a Game Boy screen was amazing. It always looked way better than it did in Deluxe Paint!"

The biggest headache occurred when creating full-screen images, such as title screens, due to display limitations. "A Game Boy screen is divided into an eight-by-eight grid and each square in that grid is a character," he explains. "When you create a full-screen picture you can actually only use about 21 unique characters. It was nowhere near enough. We had tools from the coder to highlight individual characters once we drew anything, and then we had to be creative by using flipped and rotated characters within the picture. It's always depressing butchering a nice picture but often it was required assets for a licence and there wasn't any scope for creativity. Publisher or licence logos are boring enough to draw without spending all day editing them to make them actually work on the screen."

Elliot's later games were specially optimised for use with the Super Game Boy, the device that enabled Game Boy carts to be played on the Super Nintendo console, often with added colour. Explaining the process, Elliot says: "Colour would be designed into the graphics from the start. I would have four separate palettes of four colours each. I used to work on the Spectrum so the eight-by-eight character colour issues weren't new to me, but Super Game Boy graphics were a pain. The number of people who were ever going to actually see them was so small it seemed like a bit of a waste of time. I actually put a footballer in the border for *FIFA 98* in a Watford strip and got away with it!"

Super Game Boy games at least looked better in magazines – as anyone who tried to screen-grab original Game Boy titles will tell you. Nick Walkland worked on Europress's *GB Action*,



» Bob Pape's *R-Type II* conversion was an improvement over its already fantastic predecessor.

» Street brawler *Double Dragon 3* supported cooperative play on the Game Boy.

MULTIPLAYER ON THE MOVE

You had a Game Boy. Your friends had Game Boys. Game on!

Two Game Boys could be connected together using the link cable that was initially bundled with the handheld. Conveniently, pack-in title *Tetris* included a fantastic two-player mode where players battled it out as Mario and Luigi. It was simple but genius and elevated *Tetris* to even greater heights.

As most Game Boy owners had a cable, lots of titles included two-player support. Sports titles like *Tennis* and *Golf* offered gentle competition while fighting games such as *Mortal Kombat* and *Killer Instinct* let you go toe-to-toe with a pal. The two *Double Dragon* sequels allowed you to team up with a friend and clean up the streets together.

» 'Epic' is not a word you'd ever associate with Game Boy games, but *Link's Awakening* came pretty close.

the UK's first dedicated Game Boy magazine which debuted in 1992. "Game Boy games were a complete pain to screen-grab," says Nick. "We actually took photos because it was so tricky. The Game Boy was placed in this glorified cardboard box, with a black cloth around the entrance, which you put your head inside. Like a Victorian snapper but without the phosphorous flash. But there was always motion blur and when you tried to pause games they tended to come up with a pause screen. To make matters worse the Game Boy looked, well, awful. A bland greeny-grey, with shades in-between."

Nick is not alone in his lack of love for the Game Boy. "It was awful!" laughs Ed Magnin, a programmer who'd previously worked for MicroProse and Cinemaware on Apple II and IIGS software before moving onto the Game Boy at Virgin Games. "The processor was like a Z80 but it wasn't a complete one, and there were banks of memory and the memory had to be switched in and out. So if you had a piece of artwork it wasn't just a question of whether it would fit into the cartridge, but where you had a hole to put it where it wouldn't straddle banks. You know, up until the Nintendo DS, I've always said that it was our job as programmers on Nintendo platforms to make bad technology look better than it should have."

Despite his aversions, Ed was responsible for the fantastic and faithful Game Boy version of *Prince Of Persia*. For this he also had to contend with Nintendo's famously dim view on videogame violence. "Nintendo had these policies where no-one ever died in a Nintendo game," he says. "So for *Prince Of Persia* the first thing we looked at was the slicer. We raised this and Nintendo said it was okay as long as we didn't show any blood. Even on the Game Boy they didn't want a big black puddle oozing out! The pop-up spikes on the floor were also a problem. Years later I found out that Nintendo didn't like what it called 'body deforming violence'. It was okay to get killed but not have the spikes popping out of your back."

For Ed and other developers, whether they were fans of the hardware or not, it was clear that Nintendo had devised a hugely popular platform. The Japanese firm had hit gold with the Game Boy. "It was my daughter who actually got me started on Nintendo," says Ed. "She was in kindergarten and I was out of work as the company I'd just finished a game for had gone out of business. It was hard to find a job and my daughter said 'Dad you should be doing Nintendo!'. And she was right. All of the kids had one!"

"I WANNA BE THE VERY BEST" How the sales of two huge hits stacked up

The Game Boy quickly established itself as the world's number one handheld, and this was in the face of competition from rival machines that arrived shortly after. The Atari Lynx, Sega Game Gear and PC Engine GT (TurboExpress), with their colour screens and superior hardware, looked like a clear generational leap over the Game Boy. It really was men against boys, on paper at least. But the Game Boy subverted expectations and emerged as the clear winner.

The reasons for its success are fourfold. Firstly, the Game Boy was the fastest to market so it was the first portable to capture the interest and imagination of the public. And not only was it first but it was the least expensive too. Prices obviously varied from region to region, but in anyone's language the Game Boy undercut the competition significantly. Further discounting would push the Game Boy towards an impulse purchase price point. The third factor was battery life. Four AA batteries would power the Game Boy for up to 15 hours (and possibly longer if the speaker wasn't too troubled). Rival handhelds were much hungrier, requiring more batteries and exhausting them far sooner. Having to continually buy or recharge batteries was never ideal.

Finally, and crucially, there was the Game Boy's vast library of games. More than 700 titles were released over a period of ten years. Third-party production was plentiful and Nintendo itself continued to support the machine throughout its lifespan. Three *Super Mario Land* sequels appeared in 1992, 1994 and 1998, while the release of *The Legend Of Zelda: Link's Awakening* in 1993 showed that the Game Boy could deftly entertain sprawling adventure games. There was a brace from ▶

» Hear the Game Boy's music in all its glory. Or cover it with your hand.

» There's no back light on the original Game Boy, so adjusting the contrast is a must.

» The On button for the Game Boy also acts as a very handy cartridge lock. Not like they'd fall out…

Double Dragon 3 programmer Ken Murfitt reveals that developing co-op play was tough. "There were some interesting lessons," he says. "It required the efforts of myself and another programmer, Tom Prosser, to test the game – you couldn't flush out all of the synchronisation bugs by yourself. I learned about packets and timing issues. For example, no two Game Boys run at exactly 60Hz – one will be slightly slower. This may sound obvious now but you could not rely on only the vertical blank to synchronise your two-player game."

One of the most popular uses of the link cable was transferring Pokémon between the Red and Blue versions (if you were determined to catch 'em all then linking was mandatory). Battles could be staged between collectors too. A special four-player adapter was also available, although it was only supported by a small number of games. Notable titles included *F-1 Race* (with which the adapter was bundled), *Super RC Pro-Am* and *Gauntlet II*. A mention must also go to *Faceball 2000*, a Game Boy FPS that included support for up to 16 players!

» *Prince Of Persia* programmer Ed Magnin gets to grips with the Game Boy Advance.

» *Donkey Kong* (1994) featured enhanced graphics and a retro border when played on the Super Gamer Boy.

» In *Gauntlet II*, four players could work together – just like in the arcades.

▶ everyone's favourite gorilla too, with the arrival of *Donkey Kong* in 1994 and the first of Rare's *Donkey Kong Land* games in 1995. And just when the Game Boy was starting to look tired, along came *Pokémon* in 1996. The *Pocket Monsters* phenomenon ambled its way West over the next few years and gave the Game Boy a shot in the arm.

Nintendo would refresh the hardware too. The Game Boy Pocket arrived in 1996, sporting a sleek new form and clearer LCD screen. This was followed by the Game Boy Light in 1998, a Japanese exclusive that featured a backlit screen. The long anticipated colour screen Game Boy arrived later in the same year and effectively replaced the original model. Prior to the release of the Game Boy Color, Nintendo revealed that the original Game Boy had sold in excess of 64 million units worldwide.

For graphics artist Elliot Curtis, the key reason why the Game Boy was such a sales success in the face of 'superior' competition was down to its gaming library. "It was Nintendo so it had the best games," he says. "Obviously *Tetris* shifted the units in the first place, but then you could also play *Mario*. Nintendo created games that worked well on a small screen with no colour. Everybody else seemed to be making versions of existing games that were inevitably inferior to the 'proper' version."

Programmer Ken Murfitt agrees: "Something that Nintendo understood well was that consumers enjoy straightforward products that are accessible, robust and low cost, but if I had to sum up the success of the Game Boy in one word it would be 'Tetris'."

Having experienced the Game Boy before most, Jaz Rignall is ideally placed to comment on how it held up over time. Despite the arrival of flashier portables, his appreciation of the Game Boy did not diminish. "If anything, the more I played the competition the better Nintendo's little grey brick looked," he says. "Anything with a colour screen ate batteries as fast as you could shovel them in. The Game Boy was relatively frugal, making it much friendlier on the pocket, energy-wise. It was also nicely designed. These days it looks hefty, but you could hold it and play it for hours comfortably. It was also built like a tank. The Lynx and Game Gear were fragile by comparison. I never had any qualms about bunging it into a bag and taking it anywhere. I loved the PC Engine GT but it was expensive, and some of its games were unplayable because they'd been designed for a big screen. It was also one of the all-time greats for consuming batteries. Ultimately it's about the games and not the tech, and the Game Boy proved that. It had a range of really fun carts – and *Tetris* was a killer app."

Jaz also notes the importance of handhelds to Nintendo's business over the years – from the Game Boy through to the Game Boy Advance, DS and now 3DS. "Just one look at Nintendo's numbers show how much revenue handhelds have brought in. The importance of those numbers has varied from generation to generation, but when Nintendo's flagship console hasn't done so well, handheld success has been critical. The 3DS is a good example of that. Remove its figures from Nintendo's financials from last year and things would be looking pretty dismal."

So what now for Game Boy? When the DS was introduced in 2004, Nintendo made it clear that the Game Boy name was not being retired. Given the firm's current difficulties with the Wii U, there's a possibility we may see a new Game Boy at some point. Imagine a stripped-down handheld designed specifically for playing retro games – essentially a portable Virtual Console with access to not just Game Boy games, but titles from those rival handhelds that once tried to outmuscle the small but mighty Game Boy. That would be a nice surprise. ✱

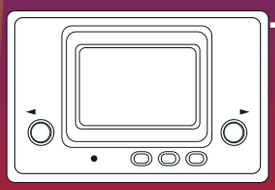
Special thanks to Warez, Bournemouth (retrowarez.co.uk) for its help with this feature

» Look away now Nintendo! The Prince attempts to pass a deadly slicer.

Nintendo GAME BOY
PROGRAMMING MANUAL & CODEBOOK
PORTABLE
GAME GENIE
VIDEO GAME ENHANCER
For the Nintendo Game Boy Compact Video Game System
Unlock the power of your favourite video games!
DOUBLE DRAGON

NINTENDO'S HANDHELD HERITAGE

An essential timeline to gaming on the go – Nintendo style



GAME & WATCH: 1980 ONWARDS

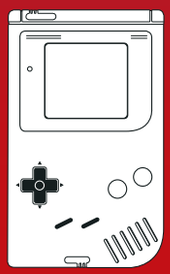
1989

GAME BOY

1998 | 1998 | 1996

GAME BOY COLOR

GAME BOY LIGHT

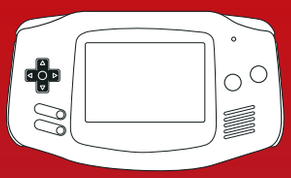


GAME BOY POCKET

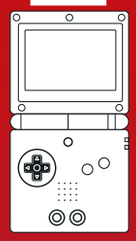
> "The more I played the competition the better Nintendo's little grey brick looked"
>
> Games journalist Jaz Rignall

GAME BOY ADVANCE

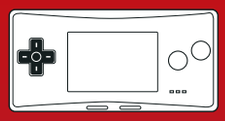
2001 | 2003 | 2005



GAME BOY ADVANCE



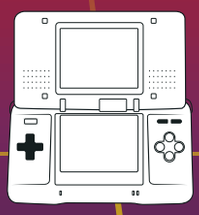
GAME BOY ADVANCE SP



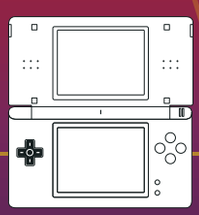
GAME BOY MICRO

NINTENDO DS

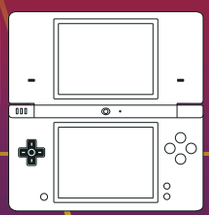
2004 | 2006 | 2008 | 2009 | 2011 | 2012 | 2013



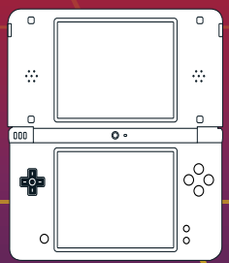
NINTENDO DS



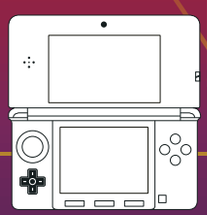
NINTENDO DS LITE



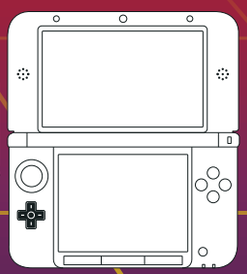
NINTENDO DSi



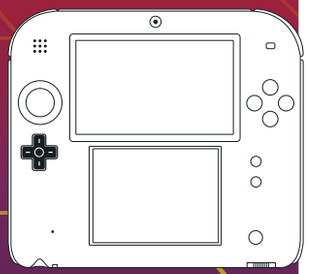
NINTENDO DSi XL



NINTENDO 3DS



NINTENDO 3DS XL



NINTENDO 2DS

Lynx

» **MANUFACTURER:** Atari Games » **YEAR:** 1989
» **COST:** £199 (£30+ today)

It's easy to see why Atari thought the Lynx was going to steamroll Nintendo's Game Boy. It was not only ridiculously powerful compared to Nintendo's rival handheld, it also boasted full colour graphics, a selection of truly stunning arcade conversions and all sorts of cool innovations that ranged from a backlit display to rotating the system 90° for vertical games and even the option to flip the control scheme so you can play it left or right-handed. In short it was a powerful, funky bit of kit that should have been the most desirable gadget of 1989.

History painted a different picture, however, and we now know that the Lynx lost out spectacularly to the Game Boy, and eventually came in third, behind Sega's Game Gear, which had launched several months later in 1990. Atari may have had sheer grunt on its side, but a lack of varied games, limited battery life and steep price drop simply couldn't save it, even when Atari redesigned it. Atari's console bowed out of the market with around 3 million units sold, but has gone on to become a great console to collect for due to its small library of games that include many impressive arcade conversions.*

Hardware Fact

■ The Lynx was created by Epyx and was known as the Handy during development. It was pitched to Nintendo, which revealed that it was working on its own hystem, the Game Boy. Needless to say Nintendo's console won out.

EDITOR'S CHOICE

S.T.U.N. Runner

The Lynx was an incredibly powerful little machine, and no game proved it more than the excellent *S.T.U.N. Runner*. Coded by D Scott Williamson, it's an astonishing port that captures all the thrills and spills of the original coin-op. The level design, digitised speech, gut-churning tunnels – it's all there and runs and an insanely fast pace. Yes it's light on substance, being a simple tunnel racer, but what it loses in bells and whistles it makes up for in sheer playability. It not only highlights the Lynx's impressive hardware specs, but also shows just what was possible in talented hands.

DAMIEN MCFERRAN SPEAKS TO DEVELOPERS AND FANS TO FIND OUT WHAT MADE NINTENDO'S LEGENDARY 16-BIT CONSOLE SO SPECIAL

PLAYING WITH POWER

CELEBRATING THE SUPER NINTENDO

SUPER NINTENDO

Many gaming systems have been branded iconic over the years, but that term seems almost inadequate to describe the Super Nintendo, a console which is perhaps the finest ever produced by industry veteran Nintendo. The Kyoto-based company's sophomore home system had the hardest of acts to follow; the NES – or Famicom as it was known in its native Japan – was a commercial success in North America and Japan, essentially granting its maker a monopoly on home console-based interactive entertainment. Post-NES, Nintendo's job was made harder by the fact that rival firms had upped their game and entered the market with powerful challengers, such as the NEC PC Engine and Sega Mega Drive, which launched in 1987 and 1988 respectively. By the time Nintendo was ready to officially announce its 16-bit console, the aging NES was losing audience share to these spritely new systems, and something drastic was required to put Nintendo back on top. Looking back now a quarter of a century later, it's impossible to deny that the SNES did just that, and much more besides. By the time Nintendo moved onto the N64, its 16-bit system was home not only to some of the finest games of the generation, but of all time – and they've endured in the years that have elapsed since then.

DIFFERENT VERSIONS

The SNES had a number of forms...

SUPER FAMICOM

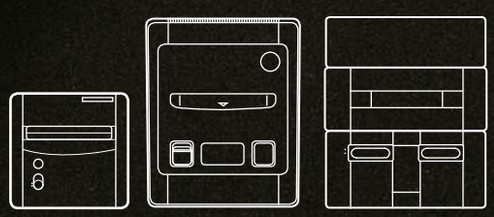
■ Sleek, playful and undeniably classy, the Super Famicom boasted a design which was far removed from the plain and boxy Famicom. The controllers were revolutionary and the four-colour logo has become a cult icon – Nintendo even resurrected the colours for its recent New Nintendo 3DS handheld. On the base of the console an expansion port exists that allows it to connect to the Japan-only Satellaview add-on. The PAL version (shown here) looks identical, but it sports SNES branding.

SNES JR/ SNES MINI

■ Launched in 1997 – a time when most players had moved onto more powerful hardware – the SNES Jr was marketed as a cheap, entry-level proposition for younger players. Smaller in size and cheaper to produce, this revised system lacks RGB output as standard but can be modified to obtain it. The power LED and eject button – both hallmarks of the original design – are also absent, as is the expansion port on the bottom.

SNES (NORTH AMERICA)

■ For some unfathomable reason, Nintendo used a totally different case design for the SNES in North America. Designed by Nintendo Of America's Lance Barr, the boxy and unattractive system dropped the four-colour buttons in favour of a purple and pink pallette. The cartridges were also changed, with the US versions adopting the same squared-off design to match the console itself. Thankfully, the European model reverted to the Japanese design, but many misguided American fans swear their version looks best.



» The front of the SNES is elegant. It sports power, eject and reset buttons in front of the cartridge slot.

Back in the early Nineties when the news came that a successor to the all-conquering NES was in the works, it wasn't just gamers the world over who were rubbing their hands with glee – developers who had made a living on Nintendo's 8-bit system were also keen to see if it could live up to the hype. "It was exciting to see the specs," recalls Chris Sutherland, a former Rare developer who is now working on *Yooka-Laylee* at Playtonic Games. "Previously I'd developed on Game Boy and many others at Rare had worked on NES, so this was a chance to develop games that had far fewer technical limitations." Fellow Rare alumni Brendan Gunn agrees. "It felt like a natural progression from the NES that I was already very familiar with. This made it very easy to get up to speed. The hardware features were far more advanced, but in ways that seemed like a very natural progression." Other developers simply couldn't believe what Nintendo was telling them. "I was given a preliminary outline of what the machine could do," remembers Nick Jones, the former Shiny Entertainment staffer responsible for the SNES versions of *Earthworm Jim* and *Alien 3*. "It seemed impossibly optimistic and with no hardware or full manual, it was hard to really make out what the machine could do. It was like somebody took every programming restriction I'd ever had and just moved the limits an order of magnitude ahead."

For Brendan and Chris, the SNES represented the next step in the evolution of the games console. "The level of restrictions on the NES and Game Boy had been raised, which is why SNES games tended to have larger characters," says Chris. "Back then, characters were typically built from a number of 8x8 sprites, and if you had more than a certain number of sprites in a row, you'd see parts of your sprite disappear." Compared to rival hardware of the time the SNES' gaming-focused internals allowed for some amazing experiences. "The SNES felt much easier to work with, but that may be because it was so much like an enhanced NES," says Brendan. "It helped that the hardware was designed very specifically with things like scrolling and parallaxing in mind, where the Amiga hardware was designed to be a more general purpose computer." Mike Dailly – who was employed at DMA Design when the SNES launched and worked on *Unirally* – feels that the system was head and shoulders above its competition. "It was better than the Amiga and PC by miles, and the hardware was better than the Mega Drive," he says. "There were just so many toys to play with. I preferred the SNES over everything else. I thought it was an amazingly cool machine."

> **"IT FELT LIKE A NATURAL PROGRESSION FROM THE NES THAT I WAS ALREADY VERY FAMILIAR WITH. THIS MADE IT VERY EASY TO GET UP TO SPEED"**
> Brendan Gunn

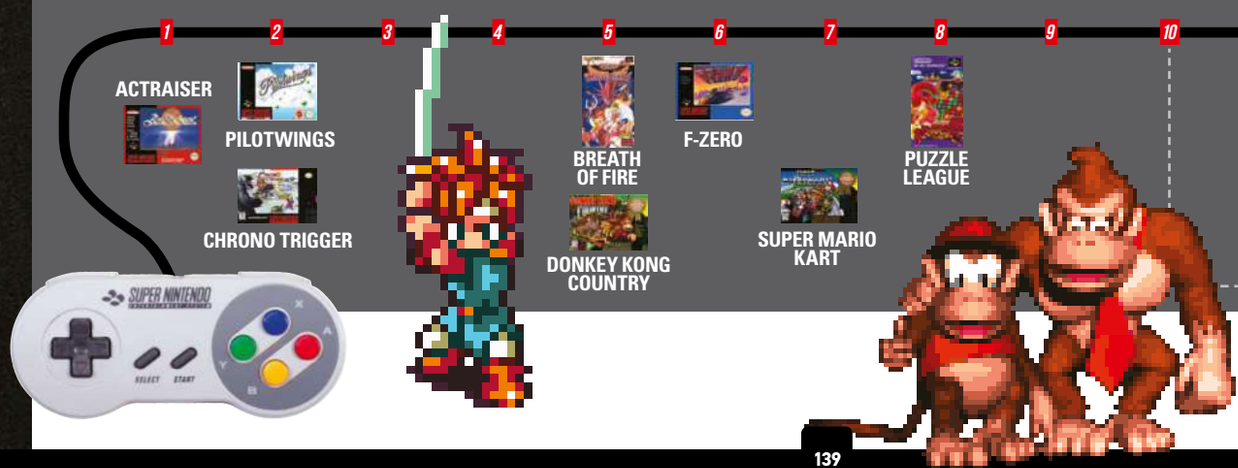
While Rare's staff was arguably in a privileged position, having gained valuable experience of Nintendo hardware via its wide selection of games on the NES and Game Boy, other developers had to muck in and learn the hard way. "I went from the C64 which had a 6502 processor straight to the SNES which had a 65816 processor," explains Nick. "They are almost identical except that the 65816 is 16-bit and the 6502 is 8-bit, so you'd think the transition would have been easy, but it wasn't. I was stuck in this mindset that I needed to optimise every byte. The hardware was a

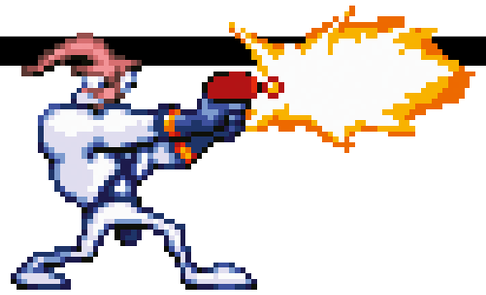
» *Pilotwings* highlights what the SNES could achieve using Mode 7.

» Many thought *Donkey Kong Country* was a next-gen game.

» *Super Mario Kart* remains our favourite game in the series.

FRANCHISE STARTERS
Just some of the brilliant franchises that began on SNES





STAR POWER

Ten legendary developers that made the SNES sing

■ Unsurprisingly, Nintendo itself was the company which did the most to define the SNES, releasing some of the console's best games.

■ The arcade conversion of *Street Fighter II* remains one of the most important SNES releases, and gave Nintendo a massive advantage over rival Sega.

■ The undisputed master of the RPG, Square produced some of its finest work on the SNES, but sadly many of its titles remained exclusive to Japan.

■ Responsible for some amazing arcade and action games for the SNES, including *Super Castlevania IV*, *Axelay*, *Parodius* and *Turtles In Time*.

■ Titles like *NBA Jam* and the *Mortal Kombat* series made Acclaim a household name in the Nineties, and it scored many commercial hits on the SNES.

> **"MODE 7 MADE THE HEADLINES, BUT WAS OF LIMITED USE FOR THE KIND OF GAMES WE WANTED TO MAKE. THE OTHER FEATURES WERE FAR MORE EXCITING TO ME"**
>
> Brendan Gunn

» The SNES pad was surprisingly comfortable and a big improvement over the NES pad.

lot more complex which took a little getting used to. The manual was written in English by what I assumed to be a Nintendo engineer who wasn't entirely fluent in English, so I had to be a flexible when reading how something worked. I still have my manuals and I prize them."

The SNES heralded a new era of trickery thanks to the inclusion of Mode 7, a graphical mode which allowed it to smoothly scale and rotate a single background layer. It was put to good use in titles like *F-Zero*, *Pilotwings*, *Super Mario Kart*, *Super Castlevania IV* and *ActRaiser*. While it was an impressive visual trick, its effectiveness was restricted outside of certain genres. "Mode 7 made all the headlines, but was of limited use for the kind of games we wanted to make," explains Brendan. "The other features were far more exciting to me. Multi-layered parallaxing and colour blending made for much richer backdrops, while bigger sprites gave us far greater capabilities for big, colourful characters," Chris agrees. "We actually stayed clear of Mode 7 for the most part because the ability to scale and rotate was so new and shiny, it felt like it was obligatory for games to use this mode. It also had limitations in its use that made us veer towards using the other modes with some tricks to appear to add more 'layers' of movement than the hardware supported."

The SNES was cutting-edge, but the market into which it was thrust was very different to the one the NES had dominated so effortlessly. Sega was no longer content with second place and thanks to savvy marketing and an earlier release it managed to secure a chunk of the North American and European markets with its Mega Drive system. What occurred next has become the stuff of legend, forever ingrained in the consciousness of the gamers who lived through it: the industry's first *real* console war. "It was interesting because this was a time when there was a difference between each platform," says Jonathan Town, a former Nintendo community manager and retro-gaming aficionado. "These days it doesn't matter too much whether you have a PC, PS4 or Xbox One as the majority of titles are the same and the differences are negligible. The SNES and Mega Drive had a charm to them and even the same game would be different depending on which console you had. Instead of arguments over frame-rates we had *Sonic* vs *Mario*, *Final Fight* vs *Streets Of Rage*, *Star Fox* vs *Silpheed*; each console had a clear personality."

Naturally, Nintendo's console was compared directly to Sega's hardware, and the respective strengths and weaknesses of the pair were highlighted in the magazines of the period. "They were both very comparable machines," says Nick Jones. "The Mega Drive had a faster processor, slightly bigger screen resolution and a synth chip for audio. The SNES had complex graphics modes, a higher range of colours, the video signal was a lot cleaner and it played audio samples for sound – which was a disadvantage and an advantage at the same time." While the SNES boasted superior capabilities, much was made of the console's slower CPU – a trade-off Nintendo made to ensure it cost less to manufacture. The weaker chip is often blamed for the lack of fast-paced shooters on the platform, but Chris Sutherland insists that it was rarely an issue from his perspective. "The speed issue wasn't something that we encountered too much with the *Donkey*

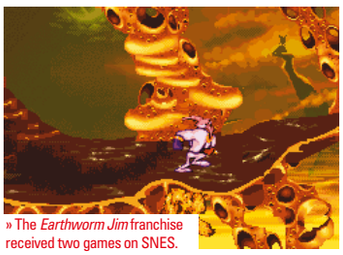
■ Virgin was a prolific publisher on both the Mega Drive and SNES, releasing titles like *Earthworm Jim*, *The Lion King* and *RoboCop Versus The Terminator*.

■ Before merging with Squaresoft, Enix was its rival and made the popular *Dragon Quest* franchise.

■ Once the home of programming Pickford siblings, this studio produced *Plok*, *Equinox*, *Ken Griffey Jr. Baseball* and more for the SNES.

■ Sunsoft's prolific work during the 16-bit era may not have yielded many solid gold classics but the company certainly pumped out quite a few SNES releases.

■ The creator of one of the SNES' most important titles – *Donkey Kong Country* – UK-based Rare mastered the hardware in a way few others could manage.



» The *Earthworm Jim* franchise received two games on SNES.

» One of the most enjoyable scrolling fighters you can play on SNES.

Kong Country series – perhaps because we were brought up on resource-starved consoles such as NES and Game Boy so we were always trying to be keep things optimised as we developed. Back then systems like that with specialised sprite video hardware that targeted video games could often outshine what was done on a standard PC."

Nick feels that the sluggish CPU was definitely a shortcoming, but like Chris, he was able to overcome this with some clever programming. "It was a little bit of a handicap for sure," he says. "The processor wasn't as powerful and it didn't have as many registers either. One advantage I had was that I came from a C64 background. The processor on that chip was even more restrictive and all games on that machine had to run at 50MHz so I learnt a lot of tricks to achieve that magical frame-rate. Even when I went to Shiny and we worked on *Earthworm Jim*, I didn't tell the Mega Drive programmers my 65816 tricks for over a year so that it evened the playing field. One of the other restrictions was the way that sprites were drawn onto the screen. The SNES was much more limited so you had to draw a lot more sprites to get the same graphic on a screen, which meant more processing power just to set the graphics up. I was able to disguise most of the difference in processor speed. If you play *Earthworm Jim* on the SNES and Mega Drive, the most obvious way to spot the speed difference is when starting a level. Because that was when the game was decompressing the level and graphics – a task limited by processing power. The levels would take about three times longer to decompress on the SNES." Nintendo augmented the power of the console with additional chips which were packed into the cartridges, the most famous of which is the Super FX chip, used in *Star Fox*.

These days, it's often the case that developers require time to fully harness the power of a console, and as a result, the software you see at launch is but a taster of what's to come – by the end of a console's lifespan, ▶

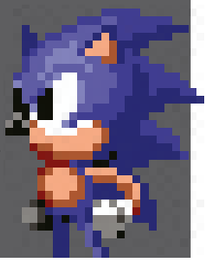
» Handily, the AV lead for the SNES's output can also be used on a GameCube if you own one.

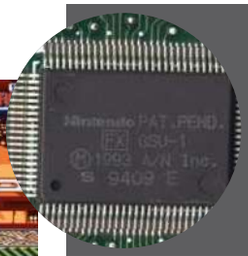
CONSOLE WARS

Scraps that defined an era

MARIO VS SONIC

■ While the *Sonic* games arguably lacked the deep playability of *Super Mario*, the blue hedgehog was marketed perfectly and stole a lot of the Italian plumber's thunder in the early-Nineties. The simultaneous worldwide launch of *Sonic 2* was an event which eclipsed even Nintendo's amazing efforts.





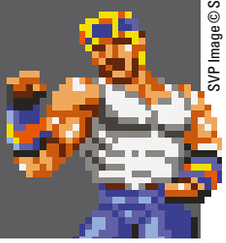
SUPER FX VS SVP

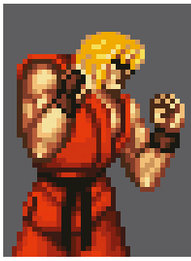
■ As the SNES and Mega Drive grew older and the industry's focus on 3D gaming became ever more apparent, Nintendo decided to enlist the help of UK developer Argonaut to create a chip to bolster the console's polygon-pushing prowess. Sega countered with the Sega Virtua Processor (SVP for short).

SVP Image © Socram8888

FINAL FIGHT VS STREETS OF RAGE

■ When Nintendo secured the port of *Final Fight* it was a massive blow to Mega Drive owners. In typical Sega fashion, the company simply created its own clone: *Streets Of Rage*. The title scored a victory over it SNES counterpart by offering a two-player mode.





STREET FIGHTER II

■ When Nintendo managed to get the first home conversion of the legendary brawler it turned Nintendo's console into the must-have system of the era. A Mega Drive release would follow in due course, but the damage was done – the SNES had scored a massive victory over its rival.

SNES VS PLAYSTATION

■ The recently-unearthed prototype has resurrected interest in this system, which would have been a SNES and Sony CD-ROM drive combined. Nintendo ditched Sony the day after the console was announced. Sony wore revenge and the SNES-less PlayStation launched in 1994, conquering the industry.

MORTAL KOMBAT

■ Family-friendly Nintendo was always going to have an issue with Midway's gore-filled fighter. Ironically, the SNES got the best port in technical terms but at Nintendo's behest the gore was expunged. While the Mega Drive version also suffered censorship, a code could unlock the gore – making it the version everyone wanted.

PERIPHERALS

The SNES had some cool add-ons...

SUPER GAME BOY

■ This nifty device not only allowed you to play Game Boy games on your TV, but expanded a fair few games in interesting ways, too. The most obvious was that you could add borders to games you played or change the traditional four shades of green to different colours. Some titles featured enhanced sound, while certain games let you use a second SNES controller to play two-player games.

SUPER EVERDRIVE

■ If you're a fan of homebrew or backing up your own games then the Super EverDrive is an essential piece of kit. It plugs into your SNES and allows you to add ROMs to it via a SD card. There are various versions available and they included Game Genie cheat codes, with optional USB ports being available for homebrew devs. It's certainly not cheap, but it's very good at what it does.

SUPER SCOPE

■ The Zapper was popular on the NES, so Nintendo tried to replicate its success with the Super Scope. While it has some decent games in the form of *Operation Thunderbolt*, *Tin Star*, *Yoshi's Safari* and *T2: The Arcade Game*, it's not as essential as the Zapper. Its biggest problem was the peripheral's rather unweildly size; while it set the Super Scope apart, it ensured it wasn't as practical to use.

SUPER NES MOUSE

■ Originally packaged with *Mario Paint*, the SNES Mouse proved to be quite a well-supported peripheral. Although a large number of games were only released in Japan, over 30 titles were released in the West, including *Cannon Fodder*, *Eye Of The Beholder*, *Pieces* and *Powermonger*. The only thing that really lets it down is the relatively short lead that connects it to your SNES.

the games are leagues ahead of earlier releases. However, the SNES is unique in that the game it launched with is still considered by many to be its finest single piece of software. All of the developers we interviewed list *Super Mario World* as one of their favourite SNES games, with Mike Dailly even rating it as his favourite game of all time. This platformer is legendary even by today's standards, and is merely the cherry on the top of a library which surely ranks as one of the best the industry has ever seen. "I definitely have to choose *Super Mario World* as my go-to game," says Jonathan Town. "However aside from that obvious choice, I really love *Axelay*. It's a lovely-looking shoot-'em-up with a gorgeous soundtrack and balanced difficulty. What really makes it for me though is *Axelay* was a console exclusive, made especially to play to the strengths of the SNES, from the incredible effect on the vertical stages to subtle use of sprite scaling on the boss battles." Some of the console's best games are, refreshingly, a little off the beaten track, such as Human's *The Firemen*. "It's a story-led action game that sort of reminds me of the movie, *Die Hard*," explains collector Stuart Brett, who is planning to publish a book about Super Famicom art soon. "A fire breaks

out at a Christmas party in a corporate skyscraper and we play as Pete Grey and Daniel McClean as they tackle the fire, floor-by-floor, rescuing employees and taking out security robots along the way. It has some great dialogue and character design. It's a lot of fun."

What makes the SNES so remarkable is that it was strong in so many genres, and literally had something to offer for gamers of all tastes. However, one genre in which it excelled was the RPG. "It was the undisputed king of RPGs," continues Stuart. "From the *Earthbound*, *Secret Of Mana* and *Chrono Trigger*, to the *Final Fantasy* series, *Illusion of Gaia* and *Tales of Phantasia* – they were just incredible games that you could sink hours into. However, that's just the tip of the iceberg. The Japanese market had hundreds more, some of which have been translated and patched by fans. I'm still discovering new RPGs for

THE COLLECTOR

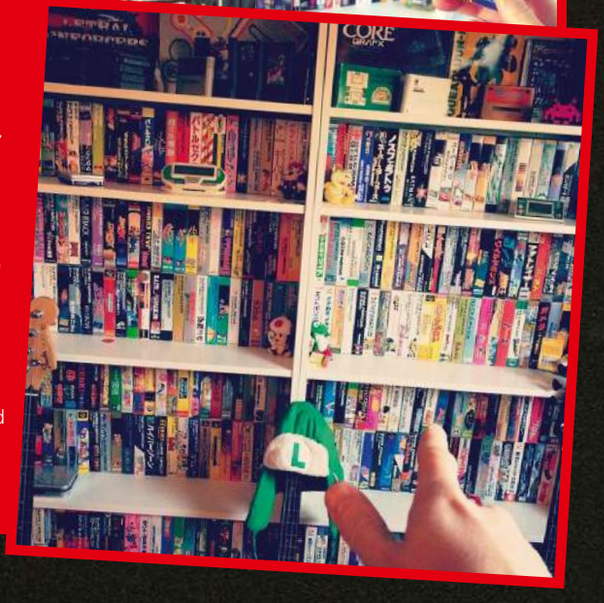
Stuart Brett on collecting Super Famicom games

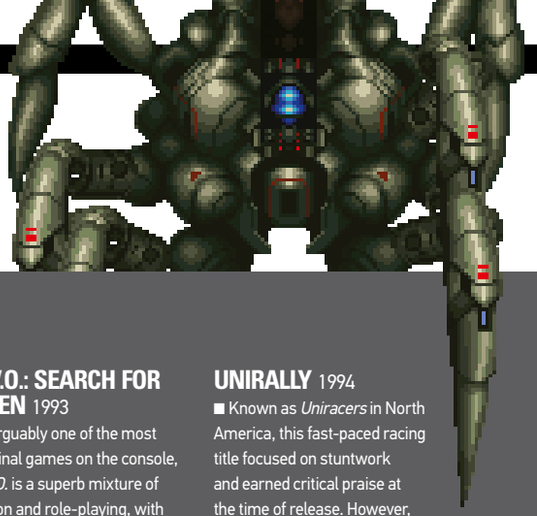
Roughly how many SNES and Super Famicom games do you have in your collection?
I have just under 400 now. Around a quarter of my games are stored away. I sold off quite a few games last year, mostly games I never play. They were taking over my games room and filling my wardrobe and I was running out space to store my clothes so I sold some off!

What single item has cost you the most?
Spider-Man: Lethal Foes. It was around £280. That was a recent purchase. All the other games I have which are worth thousands (according to ebay sellers) were never that price when I bought them. I have always tried to not overspend and I enjoy hunting down a bargain.

What item do you treasure most from this collection?
I enjoy playing my Super Famicom Box. It's a special version of the console that Nintendo developed for use in Japanese hotels. They contain some unique versions of some classic games, including *Star Fox* and *Mario Kart*.

Can you tell us a little about your book, *Super Famicom: The Box Art Collection*?
I wanted to design a book that celebrates the art and effort that went into game design in the Nineties. There will be over 250 games inside and editing the book with me is Steve Jarratt, ex-editor of *Edge*. The book will be published by Bitmap books and pre-ordering will be announced later this year.





SEQUEL THIS

Ten SNES exclusives that deserved sequels

AXELAY 1992

■ Konami's superlative shooter was not only the perfect advertisement for the console's amazing graphical capabilities, it also played like a dream – no small feat when you consider how unsuited the SNES was to this kind of game. Amazing music, gripping gameplay and timelessly attractive visuals make for a true classic – a sequel was hinted in the end credits, but never came.

ARCANA 1992

■ Unkind observers might brand this little more than a shameless clone of Sega's *Shining In The Darkness*, but it's actually a much better game that doesn't get near enough credit. Turn-based battles and dungeon-crawling make for a stern challenge, while the gorgeous visuals and a painfully beautiful soundtrack ensure it looks and sounds as good as it plays.

SOUL BLAZER 1992

■ While many fans lump this RPG in with fellow Quintet titles *Illusion Of Gaia* and *Terranigma* as a trilogy, the titles are actually self-contained offerings. Out of the three, this is perhaps the most underrated and most deserving of a sequel. It mixes exploration with real-time action, and the notion of rebuilding a world through your actions lends the game additional appeal.

PLOK 1993

■ The work of Ste and John Pickford, *Plok* is a typically zany platforming epic which apparently gained the appreciation of Shigeru Miyamoto himself. Colourful, action-packed and delightfully playable, *Plok* has since been resurrected by the Pickford brothers in a webcomic, and the 16-bit original remains one of the most unique platformers of the period.

E.V.O.: SEARCH FOR EDEN 1993

■ Arguably one of the most original games on the console, *E.V.O.* is a superb mixture of action and role-playing, with the player assuming control of various beasts from Earth's past. Success in combat allows you to level-up and evolve your creature which means they can better deal with environmental changes. It's bonkers, but compelling all the same.

UNIRALLY 1994

■ Known as *Uniracers* in North America, this fast-paced racing title focused on stuntwork and earned critical praise at the time of release. However, due to the similarity between the main character and the unicycle in Pixar's animated short *Red's Dream*, Nintendo was forced to bow to legal pressure and not manufacture any more copies once the initial 300,000 run had sold out.

» We greatly prefer the artwork found on Japanese games. The boxes feel a little sturdier too.

> **"THE SNES' WEAKNESS WAS LACK OF ARCADE CONVERSIONS OF ANY WORTH, WHILE THE MEGA DRIVE WAS DROWNING IN THEM"**
>
> Jonathan Town

the console. The latest being *Verne World*, which is set in a futuristic theme park." While there were notable shooters – like the aforementioned *Axelay* – this is practically the only genre that Nintendo's console struggled with, thanks to the slow CPU. "The SNES' weakness was lack of arcade conversions of any worth, while the Mega Drive was drowning in them," admits Jonathan. "Shooters in particular – there are a few great ones, but only a handful."

Like the Mega Drive, the SNES was supposed to get a hardware expansion which leveraged the incredible capacity of CD-ROM discs, and while Nintendo partnered with electronics giant Sony to work on the unit, it ever made it to market. The recent discovery of a SNES PlayStation prototype has put this ill-fated venture back in the headlines and jogged the memories of developers who were shown the tech at the time. "During the winter 1992 CES show, I was lucky enough to attend a private demonstration of a CD-based Sony prototype," says Brendan. "The demonstration took place in fancy hotel room well away from the show, and it was to a small group of Nintendo representatives along with a small contingent of top Rare people – and me! The demo consisted of a video streaming from the CD. I liked the concept technically, but we were not impressed with the video quality." Mike Dailly recalls that DMA was actually commissioned to produce software for the device similar to that which Brendan describes. "DMA was originally approached by Nintendo because we had a video playback engine for it. We demoed a clip of *Star Wars* playing from a 4MB cart, and they were very interested in the tech for the CD-ROM system. But it all went quiet and we started doing *Unirally* instead."

The popularity of the SNES has ensured that it is in high demand with collectors even today. Starting your own collection isn't expensive, and recent developments have lowered the barrier to entry on the more common releases. "A lot of the games have dropped in price fairly dramatically due to availability on emulators or via the Virtual Console on Wii and Wii U," says Jonathan. "US and UK RPGs still command ridiculous prices, but there are plenty of great games to be had for less than £20. The real problem is finding them in good condition – the cardboard packaging sadly doesn't fare very well if not looked after." While finding some common games at a decent price isn't going to be hard in today's market – providing you're happy with just a cartridge – the

SKYBLAZER 1994

■ A rare case of Sony Imagesoft making a decent game, *Skyblazer* is an attractive action platformer which made good use of the console's Mode 7 capabilities. Coming towards the end of the console's lifespan *Skyblazer* was perhaps unfairly ignored, and certainly deserved a 3D sequel which would have made better use of the game's flying sections.

SECRET OF EVERMORE 1995

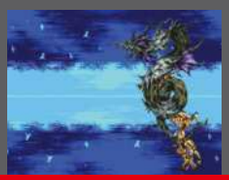
■ Following the success of *Secret Of Mana* Square decided to found a North American studio and produce an RPG aimed squarely at western audiences. While *Secret Of Evermore* wasn't up to the standard of its Japanese siblings, it was unique compared to a JRPG. It's a shame Square didn't produce more titles of this type.

MAJYUUOU: KING OF DEMONS 1995

■ Konami's shooter was not only the perfect advertisement for the console's graphical capabilities, it also played like a dream – no small feat when you consider how unsuited the SNES was to this kind of game. Amazing music, gripping gameplay and attractive visuals make for a true classic – a sequel was hinted in the end credits, but never came.

BAHAMUT LAGOON 1996

■ One of the last great RPGs of the SNES era, this Japan-only release was tipped for a western localisation but it never happened. It has been fan-translated in recent years and is well worth seeking out, if you're happy to dabble with a spot of emulation. *Bahamut Lagoon* sold almost half a million copies in Japan but no sequel was forthcoming.

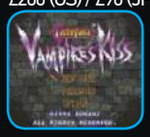


POUND SAVERS

Excellent Virtual Console options for those that can't collect the real deal

CASTLEVANIA: VAMPIRE'S KISS / DRACULA X

£200 (US) / £90 (JPN) / £225 (PAL) / (VC) £5.49



■ While it's not a patch on the PC Engine CD title from which it is derived, *Vampire's Kiss* is insanely collectable in its physical form, and demands a steep price for the most committed *Castlevania* fan. As such, this download is a much better choice for anyone interested in playing it.

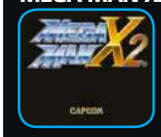
FINAL FIGHT 3 £130 (US) £120 (PAL) / (VC) £5.49

■ The third *Final Fight* outing on the SNES may not be as refined as *Streets Of Rage 2*, but it's the finest example of the genre on Nintendo's console. Haggar returns with new allies and *Street Fighter*-style moves. Its pricey second-hand but this digital release is infinitely better value.

DEMON'S CREST £170 (US) / £125 (JPN) / £260 (PAL) / (VC) £5.49

■ A commercial disaster upon its release in North America, this spin-off from the *Ghosts 'N Goblins* series focused on Firebrand, an enemy in the original games who was elevated to hero in *Gargoyle's Quest*. A mixture of platforming and RPG, this is a true hidden gem.

MEGA MAN X2 £160 (US) / £25 (JPN) £240 (PAL) / (VC) £5.49



■ The second *Mega Man X* game is notable on the SNES as it's the only home version of the game (a cut-down mobile game also exists). It builds upon the groundwork of *Mega Man X*, being far more action-packed than the earlier NES games and quite a bit easier too.

WILD GUNS £350 (US) / £160 (JPN) / £250 (PAL) / (VC) £5.49

■ A steampunk Wild West shooter with an excellent co-op mode and some brilliant, screen-filling boss battles, *Wild Guns* is yet another in-demand SNES release which requires deep pockets to own. Thank goodness, then, for this Virtual Console release.

EARTHBOUND £500 (US) / £20 (JPN) / £N/A (PAL) / (VC) £6.99

■ Recently available on the Wii U Virtual Console, *Earthbound* is a quirky and endearing RPG which, instead of featuring the usual fantasy setting, boasts a modern world invaded by aliens. The game never got a European release, and the American version is incredibly expensive.

more desirable titles are rising in value. "Videogame culture is embedded in the mainstream," says Stuart. "It's lucrative now. I think the Internet has made the retro gamer's world smaller. The chances of finding a genuine bargain online are growing smaller. I can remember paying £60 for *Majyuuou: King of Demons* back in 2007 for my Super Famicom. I thought that was expensive. I've seen copies on eBay now for over £1,300."

The SNES is one of those machines that simply grows in stature as the years roll by, and there's a good chance that people will still be talking about it in respectful tones in another quarter of a century. But why did Nintendo's console make such a massive and long-lasting impact on gamers? Why is it so fondly remembered when the hardware which followed ushered in the era of revolutionary 3D realism? "It was the final hurrah of the classic era of 2D gaming," replies Brendan. "It was a high point before the shift into the modern era of 3D polygons. As exciting as the N64 and its contemporaries were at the time, those games look dated. SNES games by comparison look gloriously retro. Also, the move to 3D created a huge increase in the complexity of games and their controllers which only enhances the charm of the 16 bit era." Chris Sutherland also feels it was the system's mastery of 2D which makes the SNES so beloved. "I think it was the last home console that used custom hardware devoted to 2D sprite games," he explains. "After that there was a transition to more general purpose CPU/GPU architectures. I think that's one of the reasons it stands out – it was almost the de facto machine for creating 2D games. Later consoles could still do that, but people started to veer towards 3D as it was the new thing."

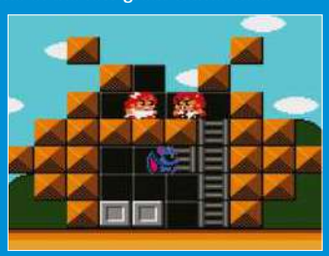
» You can use this device to connect to the Satellaview. It reminds us of the old pictures of the CD-ROM add-on.

For hardcore fans like Stuart, it's all about the software. "It introduced so many franchises for Nintendo," he concludes. "To have new games like *Mario Kart*, *F-Zero*, *Starfox*, and *Pilotwings* released within the space of a few years was exciting. There was a drive behind Nintendo in those days to try new ideas, particularly in Japan and that enthusiasm was instilled across third-party developers. Most games were coded by teams, so creativity and lack of interference was in full flow. Enix, Square, Konami, Capcom and countless others developed some truly stunning titles for the console. Recent fan translations have also breathed a new lease of life back into the console, with lots of Japanese-exclusives now being available to Westerners for the first time." So here's to the continued success of Nintendos legendary console. ✱

EDITOR'S CHOICE

Popils: The Blockbusting Challenge

This block-punching puzzle game was originally intended to come to a variety of platforms, including PC Engine and Famicom, but Tengen only ever released it for Sega's handheld platform, making it one of the few great Game Gear exclusives. The game is the brainchild of *Bubble Bobble* designer Fukio Mitsuji, and contains 100 levels in which your goal is to rescue the princess. Unfortunately walls, portals, spikes, bats and slime monsters stand in your way, making for a brain-busting challenge. And if you somehow finish all of those, there's an edit mode which allows you to make your own levels.



Game Gear

» MANUFACTURER: Sega **» YEAR:** 1990 **» COST:** £99 (launch), £40+ (today)

Sega was late to enter the handheld market, arriving a year after Atari's Lynx and Nintendo's Game Boy hit the shelves, and the company clearly chose to save time by retooling existing technology rather than starting from scratch. Externally, the bulky machine has an unremarkable design with an odd circular d-pad, three buttons (including Start) and a 3.2-inch screen. However, internally the Game Gear is heavily based on that of the Master System home console, with the addition of a new video mode that trades a lower resolution for a wider range of colours.

The result of this decision was a system that was caught between its competitors – it couldn't match the Lynx for technical wizardry like sprite scaling, and the Game Boy easily outlasted its battery consumption rate of six AA batteries roughly every four hours. While it couldn't best Nintendo's machine, Sega comfortably outpaced the Lynx thanks to superior marketing and third party support, racking up over 10 million sales. Despite this contemporary popularity, the Game Gear receives relatively little love today due to hosting few high-quality exclusive games, as well as a high long-term failure rate caused by the use of low-quality capacitors. *

Game Gear Fact

■ A Game Gear equivalent of the Super Game Boy is impossible on the Mega Drive, as the Game Gear's palette of 4,096 colours dwarfs the 512 available on the 16-bit machine.

RAM: 8KB MAIN, 16KB VIDEO
PROCESSOR: ZILOG Z80 8-BIT CPU (3.58 MHZ)
GRAPHICS: SEGA VDP (32 COLOURS – 4,096 PALETTE)
RESOLUTION: 160 X 144
AUDIO: SN76489 (FOUR-CHANNEL PSG)
MEDIA: ROM CARTRIDGE (1MB MAXIMUM)

ARCADE PERFECT

Its sheer power may have hindered its success, but SNK's console remains highly desirable. Damien McFerran discovers why...

Some retro systems are remembered fondly by the players of today because they offer vibrant and engaging gameplay experiences that continue to resonate throughout the years, but in the case of SNK's Neo-Geo system – which turned 25 last year – the opposite is often true. It is famous not because gamers owned and savoured it, but because it was always so tantalisingly out of reach. Due to the high cost of the console and its games, to be a Neo-Geo owner in the early Nineties was to be part of a very exclusive club, and unfortunately for the vast majority of those teenage players who gazed longingly at screenshots of SNK's latest games in magazines of the era, membership was something they could only dream of. "The Neo-Geo was the console that few people I knew owned and was mostly only ever seen briefly in the pages of videogame magazines or in an arcade at the seaside," says Jonathan Town, a former Nintendo UK community manager and fully-committed Neo-Geo devotee. "It was a living myth, but without the internet or YouTube to clarify any childish claims, we never knew what was true and what was not. I think here in the UK, because the Neo-Geo never really had a proper release, it was largely an unknown entity. We all wanted one."

The reason the Neo-Geo AES (short for Advanced Entertainment System) cost so much was because it was effectively an arcade machine in console clothing. The idea was simple: instead of having to replace the entire arcade board inside a cabinet, amusement centre owners could simply invest in a Neo-Geo cabinet which contained the hardware required to run the games and swap out the bulky cartridge to keep things fresh. The arcade version of the Neo-Geo – known as Multi Video System, or MVS for short – used massive, hardback-sized cartridges which could be replaced quickly, easily and – compared typical arcade boards – relatively cheaply. In comparison, standard JAMMA arcade boards were large, delicate and fiddly to replace. While AES and MVS carts weren't interchangeable, the software on them was identical. When SNK said 'arcade perfect', it really meant it – and the system's arcade pedigree would make the AES so desirable in the eyes of players.

"In the Nineties, arcades were still pretty common in the United States," explains hardcore Neo-Geo collector Jeremy Forrest. "Neo-Geo was literally everywhere. I would go to the grocery store with my parents and *Ninja Combat* was there to greet me. When I would sneak deeper into town than I was supposed to, crossing dangerous intersections against the will of my parents, it was because *League Bowling* and *Samurai Shodown II* were there at the bowling alley, waiting for me." To the kids of the Nineties, the sheer notion that it was possible to purchase a home console that was capable of replicating the same performance of a arcade machine was absolutely mind-boggling."

That mind-boggling performance came at a price, though - it was simply too expensive for the average consumer. The Gold System (two controllers and a choice of *Nam-1975* or *Baseball Stars Professional*) launched at $6499 in the States in 1990. The SNES in comparison launched a year later at $199. A Silver System package did arrive without a second controller or game for $399, but it was still an expensive proposition, particularly when you consider that the games themselves were around four times as much as their competitors'. SNK's premium price, for an admittedly premium console ultimately meant it could never be a huge commercial success.

Another issue that affected SNK's success was the machine's software library. Without the support of coin-op heavyweights such as Capcom, Konami and Namco, SNK set about creating its own franchises which would attempt to cover all the major genres, but it would be the one-on-one fighting genre where it would arguably find its most success, although even this wasn't without drawbacks. "The first SNK game that stuck in my head was *Samurai Shodown II*, because it was installed at my local diner, so I played that a lot," says James Mielke, a games journalist-turned-developer who has enjoyed tenures at Q-Games, Q Entertainment and now resides at Square Enix subsidiary Shinra Technologies – as well as running Japanese indie development event BitSummit. "Later, if memory serves, SNK popped on to my radar once again when my local pizza place in NYC's East Village installed a World Heroes cabinet next to *Street Fighter II*." In terms of timing, it was just perfect. One-on-one fighters had become the genre of choice off the back of *Street Fighter II*'s success, and SNK capitalised on this superbly.

Even today many consider the Neo-Geo to be a one-trick pony, and it is to a point due to its overwhelming, but diverse range of fighting games. It lacks the killer RPGs, platformer and racers that were so popular on its rivals, but other genres are well represented thanks to the likes of *Blazing Star*, *Metal Slug*, *Cyber-Lip*, *Magical Drop*, *Pulstar*, *Shock Troopers*, *Windjammers* and *Twinkle Star Sprites*.

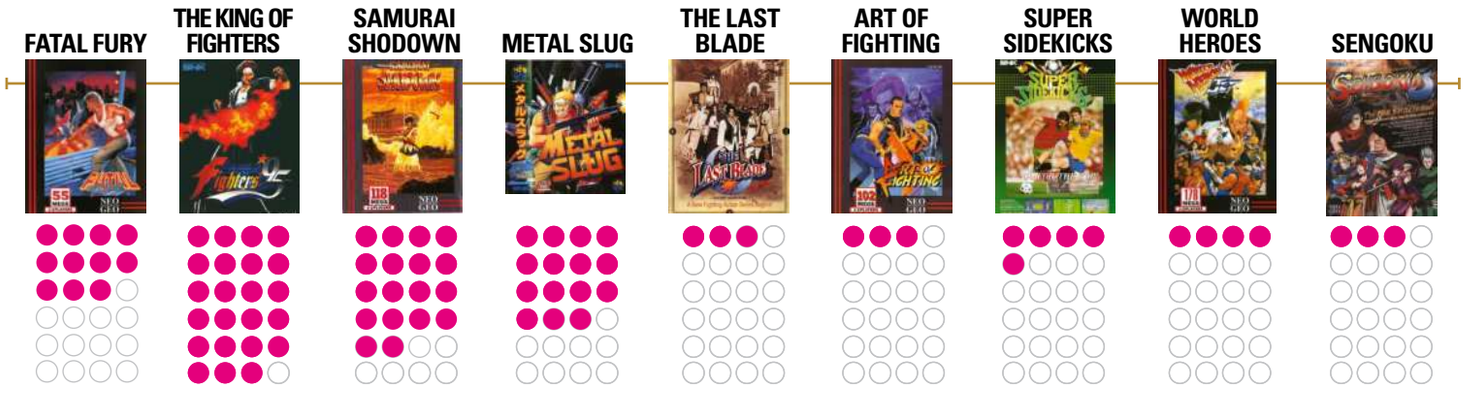
Did You Know?

■ While the Neo-Geo was marketed as a 24-bit system to differentiate it from its 16-bit rivals, it was actually sported a 16-bit, 68000-chipset twinned with an 8-bit Z80 coprocessor.

Franchise Starter

The Neo-Geo kicked off a lot of popular games series

● NUMBER OF GAMES RELEASED



Console war

Key Stats for the Neo Geo, SNES and Mega Drive

Did You Know?

■ Official software support for the machine ran from 1990 until 2004, but unofficial, unlicensed games are still being produced for the console.

NEO-GEO

- ★ **CPU:** Motorola 68000 (12 MHz), Zilog Z80 coprocessor (4 MHz)
- **RAM:** 64KB SRAM (main), 84KB SRAM (video)
- ★ **COLOUR PALLETTE:** 65,536
- ★ **COLOURS ON-SCREEN:** 4096
- ★ **SPRITES ON-SCREEN:** 380
- ★ **YEARS ACTIVE:** 1990-2004
- **UNITS SOLD:** 980,000 (as of 1997)
- **PRICE:** $649

SNES

- **CPU:** Custom 65c816 (3.58 MHz)
- **RAM:** 128 KB (main), 64 KB (video) ★
- **COLOUR PALLETTE:** 32,768
- **COLOURS ON-SCREEN:** 256
- **SPRITES ON-SCREEN:** 128
- **YEARS ACTIVE:** 1990-1999
- **UNITS SOLD:** 49 million ★
- **PRICE:** $199

MEGA DRIVE

- **CPU:** Motorola 68000 (7.6 MHz), Zilog Z80 sub-processor
- **RAM:** 64 KB (main), 64 KB (Video)
- **COLOUR PALLETTE:** 512
- **COLOURS ON-SCREEN:** 64
- **SPRITES ON-SCREEN:** 80
- **YEARS ACTIVE:** 1988-1997
- **UNITS SOLD:** 40 million (estimated)
- **PRICE:** $189 ★

★ **HIGHEST STATISTICS**

» SNK left owners with no doubt that its new console was, "A quantum leap forward in video entertainment."

While the Neo-Geo's library is somewhat small, it's packed with classics – making the act of picking out one title which defines the system near-impossible. "You might as well ask a mother which child is her favourite!" Jeremy laughs. "If I had to pick one it would have to be *The Last Blade*. All the characters are appealing and fun to master. The animation is smooth, and the controls are spot-on. I also absolutely love the deflection system, it makes the game so much more tactical. To me, *The Last Blade* is one of the few games of the era that transcend just being a game, and experimented being a work of art. In a time when games were just trying to be profitable, *The Last Blade* was trying to be an interactive, masterful work of art." Indeed, this seminal fighting title is a shining example of the level of perfection SNK had managed to achieve within the genre, and, unsurprisingly, remains in high demand among collectors. For James, another famous Neo-Geo fighter is close to his heart. "*Garou: Mark Of The Wolves* is still one of the best 2D fighting games, and it really stood out from the rest of the *Fatal Fury* series," he says. "Its primary competition at the time, *Street Fighter III*, got a lot more attention, but I think *Garou* is the better game."

Did You Know?

■ The AES home system was initially intended for commercial locations such as hotels and bars, but consumer reaction convinced SNK to produce a domestic version.

While other systems have come and gone, the Neo-Geo continues to make its presence felt in collector's circles, generating intense interest among hardcore players and videogame fans in general. "I reckon this is because it was one of the purest, most hardcore gaming systems around," says James. "It was all about the games. Also, the underdog always tends to hold a higher reputation, and it stuck around for a long time. The system was loaded with classic games, and the controllers and arcade sticks were iconic." A huge factor in this prolonged fame is down to the sheer desirability of the console, but there's more to it than that. "A lot of Neo-Geo fans would tell you Neo-Geo is special to them as it represents something they could not obtain as a child," says Jeremy. "In a way I can understand this because I remember begging my parents to get me one, and the feeling I received after obtaining one as an adult. I feel the console is still beloved today because the Neo-Geo has such a solid library of games. If the console consisted solely of titles like *3 Count Bout* and *Legend Of Success Joe* we wouldn't be having this discussion."

Inside the Neo-Geo A look at the guts that powered SNK's console

GRAPHICS PROCESSING UNIT

■ This custom chipset gives the Neo-Geo a real edge over its 16-bit rivals, allowing the console to scale and manipulate sprites smoothly. 380 sprites can be rendered simultaneously.

THE CPU

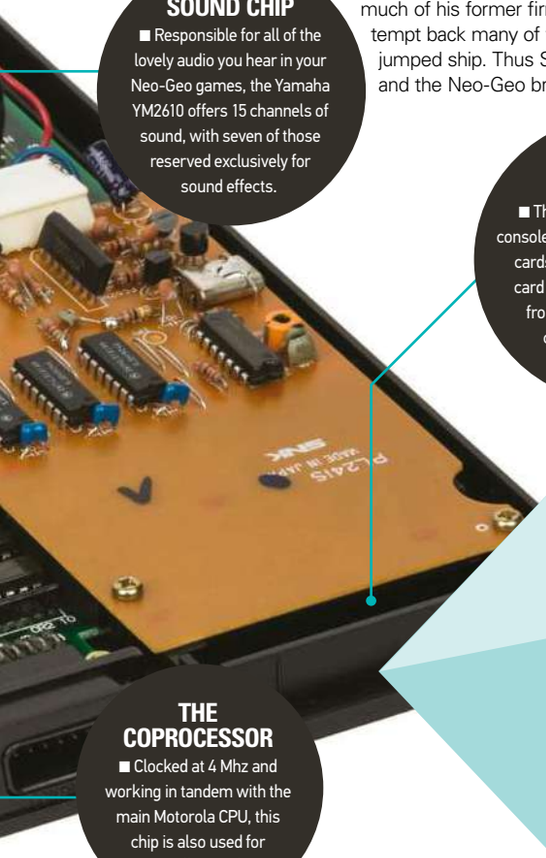
■ The brain of the Neo-Geo is a Motorola 68000, although some units had equivalent chips produced by Toshiba or Hitachi. The CPU is clocked at 12 MHz.

> "We had to use the original Neo-Geo code – we weren't allowed to re-code the games"
>
> Jim Philpot

As the Nineties wore on, SNK's console began to struggle, unable to compete with its cheaper peers and the advent of 3D gaming that became the standard thanks to the PlayStation. The platform continued to receive solid software support, though. However, 2001 brought with it financial problems. Following SNK's purchase by pachinko machine maker Aruze, SNK founder Eikichi Kawasaki left the company to form Playmore, and when SNK slipped into bankruptcy that October, Kawasaki would purchase much of his former firm's intellectual rights and tempt back many of the developers who had since jumped ship. Thus SNK Playmore was formed, and the Neo-Geo brand was revived once more.

Part of SNK Playmore's strategy during this period was to ensure a steady stream of ports to other systems. It made sense as the consoles of the period – the PlayStation 2, Xbox and later Wii – were all capable of hosting faithful replications of the big games, and it allowed fans who couldn't afford the AES hardware the chance to enjoy SNK's library at a lower cost. In Europe, these titles were published by Ignition Entertainment. Former Ignition employee Jim Philpot recalls that SNK Playmore was quite stringent when it came to quality, although some ports, particularly the PS2 compilations, were far from perfect. "We had to use the original Neo-Geo code – we weren't allowed to re-code the games so essentially every release was a Neo-Geo emulator. All we ever got as our starting point was the Neo-Geo assembler code. Sound effects and artwork were ripped directly from this data. It's the only option we had, but it did mean the games were perfect replicas. It's not well known that it was the work of one programmer – one of the best I've ever worked with then, or since, Ade Scotney. Ade has worked in the industry from the very beginning and has quite an impressive back catalogue, but he's always preferred a low profile. Without him the games would never have made it to console – it's as simple as that." ▶

» Here's another view of the memory card. It's an incredibly slim piece of equipment and it's quite delicate.



SOUND CHIP
■ Responsible for all of the lovely audio you hear in your Neo-Geo games, the Yamaha YM2610 offers 15 channels of sound, with seven of those reserved exclusively for sound effects.

MEMORY CARD SLOT
■ The Neo-Geo was the first console to use removable memory cards for save game data. The card slots into this port on the front of the machine and it can also be used with MVS cabinets.

THE COPROCESSOR
■ Clocked at 4 Mhz and working in tandem with the main Motorola CPU, this chip is also used for controlling audio.

Blazing a trail

How SNK set a trend with its Memory Card

Modern machines may have done away with the archaic concept of memory cards thanks to their roomy internal hard drives, but when CD systems first arrived in the Nineties such items became utterly essential for saving in-game progress. However, despite what you may assume they didn't actually originate with the likes of Sony's PlayStation and Sega's Saturn – SNK beat both to the punch by almost half a decade. The memory card which shipped alongside the Neo-Geo had a slightly different aim to the one which would become such an intrinsic part of our lives when the PlayStation arrived – it was designed to allow arcade players to carry over their progress on the home console, and vice versa. It could hold a whopping two kilobytes of data. A built-in lithium battery keeps the data alive, but replacing it is tricky.

Ten Great Games (That weren't beat-'em-ups)

LAST RESORT 1992

■ An early shooter release for SNK, but arguably one of its finest. The gameplay may not offer anything particularly original but it's addictive and compelling, helped in no small part by the unique visuals which possess a grim and foreboding atmosphere. One of the more underappreciated gems in the Neo-Geo library, *Last Resort* is well worth a look for shooter fans.

PUZZLE BOBBLE 1994

■ A spin-off of Taito's famous *Bubble Bobble* franchise was renamed *Bust-A-Move* in some regions and went on to become a considerable hit on consoles like the PlayStation and Saturn. The match three bubble-popping gameplay means instant playability, and the concept has been cloned many times over the past few decades. A 1999 Neo-Geo sequel is also available.

PULSTAR 1995

■ The Neo-Geo never got a port of *R-Type*, but then it didn't really need one as Aicom's 1995 shooter *Pulstar* does a pretty fine impression of Irem's seminal arcade classic. Pre-rendered sprites give the whole experience a very clean and shiny appearance, while the intense and challenging gameplay make this a real test for fans of the shoot-'em-up genre.

TWINKLE STAR SPRITES 1996

■ One of the most unique titles on the Neo-Geo, this puzzle/shooter hybrid is also one of the system's premier two-player experiences. The screen is divided in two with each player taking a side, and shooting down waves of enemies allows you to plant them on your rival's screen – the last player standing is the winner.

NEO TURF MASTERS 1996

■ Proof that the Neo-Geo was capable of handling effective sports simulations, *Neo Turf Masters* is an arcade experience which offers short-burst challenges rather than a lengthy career, but is all the better for it. Golf is often derided as being a pedestrian sport, but Nazca's take is fast-paced and thrilling, making this one of the jewels in the Neo-Geo's crown.

» The controllers were excellent, feeling like proper arcade sticks. They were obviously expensive, too.

▶ Ignition quickly found that these ports became a key revenue stream. "It's likely that had we not have had those titles, Ignition wouldn't have lasted as long as it did," says Jim. "It was the SNK games that provided the revenue that kept the development side fuelled. SNK were very hands-off in the end. We had such a smooth operation going that all they used to do in the end was send us source code and then start phoning up chasing royalties!"

While Ignition's ports found a largely receptive audience, dedicated fans remain adamant that the only authentic way to experience the Neo-Geo library is on the original hardware. As is the case with any classic system, the Neo-Geo and its software are in constant demand in today's second-hand market, but seeking out SNK's platform requires a level of financial dedication that is arguably unmatched in the realm of videogaming. "In the world of Neo-Geo AES collecting, most of the older games are the cheapest while newer games being more expensive, roughly speaking," explains Jonathan. "Although that's not always the case, you'll find that many of the launch window titles can be picked up for less than £100 – however, move along a few years and you'll quickly find games shooting up over the £200 price point. Some of the later entries, such as the amazing *Garou: Mark Of The Wolves* will easily set you back between £500 to £800 and most people are aware of *Metal Slug*'s ridiculous £1,000+ going rate. If you're tight on budget but just want to play, the Neo-Geo CD system is a good choice as the prices are reasonable, just be aware that not all the games made it to CD format and some of the loading times are really bad. Finally, if you're really not too fussed about the presentation of the packaging, get yourself either a Supergun or a cheap arcade cabinet and an MVS system; MVS games are cheap as chips. *Metal Slug* can be found for about £25, for example."

While Jonathan is a cautious advocate of the AES route, Jeremy feels that anyone looking to begin a Neo-Geo collection should totally ignore the home variant and instead opt for the arcade MVS format. "Home cartridge games are way too expensive," he says. "You will spend more money on a MVS setup opposed to an AES

Did You Know?

■ The system's launch price in the US was $649 (two controllers, one game) for the Gold System and $399 for the Silver (one controller, no game).

NEO BOMBERMAN 1997

One of only two games released by Hudson Soft on the Neo-Geo – the other being puzzle game *Panic Bomber*. *Neo Bomberman* is, as you would expect, a fairly traditional take on the established *Bomberman* concept. It benefits from excellent visuals and sound, but lacks an AES edition – if you're interested then you'll have to pick it up on an MVS cart.

MONEY IDOL EXCHANGER 1997

A puzzle title where you match together coins to clear an ever-falling flood of currency, *Money Idol Exchanger* is one of those games which is easy to pick up but difficult to put down. Aided by some incredibly cute visuals, it's another often overlooked classic in the Neo-Geo library. Sadly, no AES version exists.

SHOCK TROOPERS 1997

Saurus' take on the tried-and-tested *Commando* template is a graphical tour de force packed with explosions, gunfire and it is absolutely packed with character. Massive sprites, varied environments and an excellent two-player mode all combine to make this feel like a top-down *Metal Slug*, and it's one title that should be high on everyone's list.

BLAZING STAR 1998

The sequel to the equally excellent Neo-Geo shoot-'em-up *Pulstar*, *Blazing Star* boasts a combination of pre-rendered and hand-drawn sprites, and uses the host hardware's scaling capabilities very effectively indeed. Weighing in at a considerable 348 megabits, this is one of the system's most beloved blasters, and with good reason.

METAL SLUG X 1999

Essentially a remix of 1998's *Metal Slug 2*, *Metal Slug X* is considered by some fans of the run-and-gun series to be the best offering. One of the franchises which arguably defines the Neo-Geo format, *Metal Slug*'s appeal remains undiminished even after all these years thanks to its fusion of tight gameplay, amazing visuals and over-the-top carnage. Essential.

» The Neo-Geo catered to two-player gaming with two available ports on the system's front.

> **Developing for Neo-Geo is kind of like working on a classic car**
>
> Timm Hellwig

setup initially, but it will pay for itself when you save thousands of pounds on games."

The Neo-Geo's status as one of the most desireable gaming systems of all time has ensured continued developer interest right up to the present day, making it one of the longest-supported domestic console formats, although the number of active developers is predictably tiny. One of the most notable is German studio NG:DEV.TEAM, which has been responsible for recent MVS titles such as *Last Hope* (2006), *Fast Striker* (2010), *Gunlord* (2012) and the forthcoming *Kraut Hunter* (2016). NG:DEV.TEAM founder Timm Hellwig explains that the active and enthusiastic community which has grown up around the system means that his company can continue to produce new software. "The support of the community is great, and we still have a lot of fun developing games for it," he says. NG:DEV.TEAM's expertise in coding for SNK's system means Timm is ideally placed to comment on the task of creating software for a console whose technical zenith was almost three decades ago. "It's very hard sometimes as every little thing can become a challenge," he explains. "In some aspects it's easier though, as we not only have full control over everything, we also know every bit of the system. With newer game systems everything is abstracted; developers neither have access to it nor do they know what is going on under the hood of the machine. Developing for Neo-Geo is kind of like working on a classic car."

NG:DEV.TEAM goes the whole distance when it comes to making new Neo-Geo games, not only manufacturing MVS carts but also creating unique AES editions – complete with case, inlay and manual – for home collectors. The prices are eye-watering, with AES versions costing around £390. You might assume that it would be financially impossible to keep this kind of software support going, but that isn't the case. "There's enough demand to build a successful business from it," states Timm. "We have slow but steady growth in the market. The high cartridge prices help to make this possible. At significantly lower prices, the business model would not work."

New software is just one way in which the Neo-Geo brand is being kept alive. Christopher Taber's Analogue Interactive is using lavish hardware to maintain the gaming public's interest in SNK's aging system, and has to date produced a trio of super-exclusive systems which push the already desirable brand into new levels of luxury. The first wooden Consolized MVS was followed by the CMVS Slim, and both machines are encased in solid wood. More recently Taber's company has produced the Analogue NEO, which is a CMVS combined with two joysticks all in one piece of wood for the ultimate arcade experience. All of Christopher's ▶

» Although some games are insanely expensive, it's possible to get plenty of decent titles at reasonable prices.

» Many Neo-Geo owners prefer to get their hands on earlier machines, as the output is better on them.

Non-Ported Exclusives

Five fantastic NEO-GEO games that never reached other systems

CYBER-LIP 1990

■ Despite the odd name and rough visuals this remains a classic and it is said that some of its developers would go on to work on *Metal Slug*. Borrowing concepts from Konami's famous *Contra* franchise, *Cyber-Lip* is packed with action and is still pleasantly challenging.

ZED BLADE 1994

■ Also known as *Operation Ragnarok*, *Zed Blade* is a shooter which has largely been forgotten by the SNK faithful. It's not in the same league as *Blazing Star* or *Viewpoint*, but its status as a true Neo-Geo exclusive makes it worth a closer look. The visuals are also eye-catching, especially for 1994.

WINDJAMMERS 1994

■ Another solid Neo-Geo classic, *Windjammers* is a sports title where the object is to hurl a disc into your opponent's goal. Crazy power-up moves and trick shots make this souped-up take on *Pong* compelling when two players are involved, and its reputation ensures it is in constant demand.

NEO DRIFT OUT: NEW TECHNOLOGY 1996

■ The Neo-Geo hardware couldn't handle 3D visuals so driving games usually adopted a fixed perspective – like this rally title from Visco. Fluid controls and short courses make this the ideal pick-up-and-play racer, and it's surprising how authentic the rallying experience feels.

NIGHTMARE IN THE DARK 2000

■ Playing a lot like Taito's *Bubble Bobble* and *Don Doko Don*, *Nightmare In The Dark* boasts the kind of visuals you'd expect to see Tim Burton come up with, and also showcases a superb soundtrack. Exclusive to the console, AM Factory's excellent title has sadly been ignored by a great many gamers.

Did You Know?

■ 2004's *Samurai Shodown V* Special is the last official game for the system published by SNK. It shipped on a 708 megabit cartridge.

machines come with RGB, component, S-Video and composite output, ensuring that they work on practically any television set you could choose to hook them up to. This is the very upper tier of Neo-Geo collecting. "Every single Analogue CMVS is entirely hand-crafted," Christopher explains. "Every piece of wood is hand selected by our woodworker and we only use the most beautiful pieces of each board foot – the ones with the most stunning grain patterns. Everything is entirely built and assembled by hand in the USA. Our Neo-Geo products are very special to us and that is the only way we will ever build them."

> **"Everything is entirely built and assembled by hand"**
> Christopher Taber

Ironically, Christopher says that the impetus to produce these incredibly expensive systems was borne out of the fact that collecting for the AES format was so prohibitive. "Being able to explore the Neo-Geo library with an AES is unreasonably expensive," he says. "With MVS, not only are the games much easier to find, they are a fraction of the cost. Out of all the Neo-Geo platforms, the MVS library represents the most complete, too. MVS is pretty much unanimously regarded as the best way to play Neo-Geo. Problem is, you either have to play with an arcade cabinet or rig up your own DIY Supergun system to play MVS without a cab – which is unreasonable for most people." To overcome this, Christopher took the guts of the MVS system and placed them inside a console-like shell, as well as adding a whole range of outputs. The result is easily one of the most desirable Neo-Geo systems currently available, yet it offers access to the cheaper world of MVS collecting.

In 2012 it appeared that SNK Playmore was getting ready to give its famous system a new lease of life. By far the most audacious attempt to revive the brand, the handheld Neo-Geo X was billed as the second coming of the Neo-Geo line. Manufactured by US firm Tommo with SNK Playmore's blessing, the system is designed to slot into a docking station shaped just like the original AES console, and even comes with a joystick which is based on that one which shipped with the famous machine. What should have been a glorious resurrection of the brand has ended in a bitter legal battle, as SNK Playmore has ordered Tommo to remove stock from shelves and cease production. At the time of writing the Neo-Geo X is still widely available. "Neo-Geo X is still fine to sell," says FunStock general manager Andy Pearson, the main retailer of the console in the UK. "We continue to sell it on a regular basis and all of the new consoles ship with the latest firmware, which resolved a lot of the issues." This confusion has only served to muddle what could have been a genuine revival of the legendary brand.

The Neo-Geo X furore is perhaps indicative of the kind of company that SNK Playmore has become – but the story continues to twist and turn. In August 2015 SNK Playmore was purchased by Chinese investors with the intention of using the company's vast library of IP to create a media empire which will cover games, anime, movies and much more besides. Time will tell if this grand vision can be pulled off, but it's highly unlikely we'll witness another console as unique as the Neo-Geo. "Releasing a console which is purely for gaming for a hardcore fanbase is going to be an exceptionally rare thing," says James. "I think the closest thing to that right now would be the PlayStation Vita, which seems to be a bastion

» As with many consoles of the time, the Neo-Geo AES sports a reset button.

Collector interview

Vinnie Stokes of Facebook's G.G.G. shares his love for SNK's console

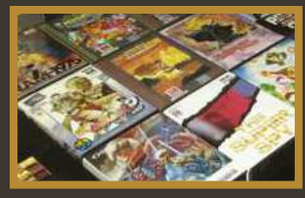
What drew you to collecting for the Neo-Geo AES?
I always wanted a Neo-Geo as a teenager, but I could have never afforded one back then. Neo-Geo (in the arcade) always had the edge as a teen… I loved *Super Sidekicks*.

How complete is your collection, is there anything you're still after?
My AES collection isn't that big, around 15 games. I also have the Neo-Geo pocket, Colour (with games), CD, Neo-Geo X and a full-size arcade cabinet, the cabinet has a 150-in-one cart.

Why do you think the machine remains so collectible?
The Neo-Geo for many collectors is the ultimate Nineties arcade experience, only true gamer/collectors appreciate them to justify the expense of collecting them.

Do you think the games are worth the money they go for?
Everything has a price I guess, but yeah, they are worth it. If you want arcade quality then there is no competition.

Do you have a Neo-Geo CD? How does it compare?
I do have a Neo-Geo CD, but I've never played it. Can't beat blowing a cart in my opinion.



What ten games would you recommend to those on a budget?
There are lots of £30-£50 games you can pick up, mainly fighting ones, to be honest. *Sidekicks* is a must-have for footy fans though.

Do you feel the Neo-Geo X is a good compromise for those that can't afford the real deal and just want to experience the games?
The Neo-Geo X is another I just had to have in my collection but it's still sealed in its box, never played. So my answer to that is, nothing compares to firmly pushing that big old cart into the slot and flicking the switch.

Did You Know?

■ The Neo-Geo's colour palette was 65,536 colours, and it could display 4096 colours on-screen at any time.

Neo-Geo: The Alternatives

If you're not willing to drop hundreds of pounds to buy your way into the Neo-Geo club, don't despair – many of its best games made the journey to more affordable platforms

1 METAL SLUG ANTHOLOGY PSP

PRICE: PSP: £15
Neo-Geo £4500

PROS: Six Neo-Geo games, bonus art and a developer interview.

CONS: Lengthy loading times.

★★★★☆

2 METAL SLUG 3 XBOX

PRICE: Xbox: £4
Neo-Geo £500

PROS: Offers two bonus scenario games.

CONS: Continues send you back to the start of the stage.

★★★★☆

3 SNK ARCADE CLASSICS VOL. 1 PSP

PRICE: PSP: £10
Neo-Geo £4300

PROS: 16 Neo-Geo games, a great spread of genres.

CONS: Long loading times, a little slowdown. ★★★★☆

4 THE KING OF FIGHTERS '97 SATURN

PRICE: Saturn £10
Neo-Geo £70

PROS: Faithful port, with an great soundtrack.

CONS: Long loading times, slightly muffled sound effects and speech. ★★★★☆

5 SNK VS CAPCOM: SVC CHAOS XBOX

PRICE: Xbox: £5
Neo-Geo £220

PROS: High resolution HUD, online play (now closed).

CONS: Few extras. ★★★★☆

6 METAL SLUG X PLAYSTATION

PRICE: PlayStation: £12
Neo-Geo £700

PROS: Faithful gameplay, plus an added Combat School challenge mode.

CONS: Cut-down animation, long loading times and poor sound effects. ★★★☆☆

7 THE KING OF FIGHTERS COLLECTION: THE OROCHI SAGA PS2

PRICE: PS2: £10
Neo-Geo £330

PROS: Five games, with unlockable music/art galleries.

CONS: Slight screen stretching, occasional audio bugs. ★★★☆☆

8 GAROU: MARK OF THE WOLVES DREAMCAST

PRICE: Dreamcast: £18
Neo-Geo £475

PROS: Unlockable gallery, arranged soundtrack.

CONS: Replaced voice effects, some slowdown issues.

★★★☆☆

9 TWINKLE STAR SPRITES DREAMCAST

PRICE: Dreamcast: £40
Neo-Geo £225

PROS: Arranged soundtrack, option to remove slowdown.

CONS: Missing many extras from prior Saturn version.

★★★★☆

10 NEO-GEO X

PRICE: Neo Geo X: £120
Neo-Geo £3000

PROS: Replica console with joystick, HDMI output, 20 built-in games plus the option to buy more, and a handheld unit!

CONS: Relatively expensive, new game releases discontinued, handheld's screen is sub-par. ★★★★☆

Special thanks to The National Videogame Arcade and Vinnie Stokes for supplying their Neo-Geo consoles for the photography in this issue. Check out Vinnie's Facebook page Game Gear Group for more information.

> **A lot of things made the Neo-Geo irresistibly exclusive**
>
> James Mielke

of hardcore games coming out of Japan, but it's still not quite the same. The Neo-Geo was a console borne out of an arcade legacy, and with arcades what they are – or aren't – today, I have serious doubts there will ever be another like it."

Jeremy is in agreement. "A lot of things made the Neo-Geo irresistibly exclusive," he summarises. "Mainly the price of the console, the price of games, and the inability for youngsters to obtain it. It brought the arcade experience home, which isn't an issue anymore. These days the arcade experience is at home – you can't go out to an arcade like you use to, and come home to your vastly-underpowered NES longing for more."

SNK broke exciting new ground with the release of its Neo-Geo system, but its obscenely high price point and obsession with fighting games arguably stopped it from being the universal success that the company craved so greatly. We're eternally grateful that SNK did shoot for the stars however, because it delivered a unique console that remains as exciting and desirable today as it did on its original release.

Super Scope

» **PLATFORM:** SNES » **RELEASED:** 1992 » **COST:** £59.99 (LAUNCH), £20+ (TODAY, BOXED), £10+ (TODAY, LOOSE)

If there's one thing that console manufacturers agreed on during the Eighties and early Nineties, it was that gamers wanted guns. Nintendo's NES bundle featuring a Zapper and *Duck Hunt* was popular, and if you bought Sega or Atari consoles you could get bundled guns, too. With that in mind, Nintendo kept the tradition going on the SNES with the Super Scope – however, this time it opted to supersize its weaponry. Rather than a pistol shape, the Super Scope took the form of a large bazooka, an unwieldy but visually exciting armament. As it was wireless, the device also required a sensor and batteries to function.

The Super Scope came bundled with a six-game compilation cartridge, including unconventional things like the puzzle game Blastris. This variety proved to be a good thing for Super Scope owners, as the peripheral didn't receive a huge amount of support after launch. Just four other publishers released dedicated Super Scope games, and none of them released more than one. As a result, Nintendo had to provide most of the software support for its peripheral, and the Super Scope ultimately ended up with its initial compilation, eight full games and some bonus minigames on three other cartridges. ✱

Super Scope Fact

■ The Super Scope was introduced into *Super Smash Bros. Melee* as a weapon for fighters to use, and has since become one of the series' staple items.

ESSENTIAL GAME Tin Star

If you want something a little different then *Tin Star* is the kind of oddball game that might just appeal to you. Taking place in a Wild West setting populated by robots, *Tin Star* offers you a variety of shooting challenges including classic shootouts, object juggling, protection of civilians and general bad guy blasting. The cartoon visuals are excellent and the varied game styles will keep you engaged for longer than more straightforward gun games. Sadly, the game was only released in North America, so you'll need to track down an imported copy.

Atari Jaguar Fact

■ The Atari Jaguar may have had a short commercial life but the system's casing at least lived on in the form of a dental camera manufactured by Imagin Systems.

PROCESSOR: 'TOM' CHIP 26.59 MHZ
RAM: 2MB ON A 64-BIT BUS WITH 4 16-BIT FAT PAGE MODE DRAMS
GRAPHICS: 32-BIT RISC ARCHITECTURE, 4 KB INTERNAL RAM WITH SOFTWARE-BASED GRAPHICAL EFFECTS
AUDIO: 'JERRY' CHIP 26.59 MHZ
MEDIA: ROM CARTRIDGE (UP TO 6MB)

Atari Jaguar

» **MANUFACTURER:** Atari Corporation » **YEAR:** 1993 » **COST:** £229 (launch) £80+ (today)

Atari Corporation's last console is a fascinating one. It has a rabid fan base that comes close to the Dreamcast in terms of its sheer ferocity for championing the system, but the Jaguar is also equally unfairly derided as being a spectacular car crash of a console that was doomed from the start. Both of those viewpoints have done nothing to soften the negative image that Atari's console has built up over the years and the truth lies somewhere in the middle of those two polarising views.

Regardless of whether you sit in the 'Jaguar was the first true 64-bit console' camp or not, there is no denying that Atari's machine was a powerful bit of kit at the time of its release and Atari Corp released it at a competitive price as well. It wasn't enough, though and despite some solid looking 3D games and some quality conversions of older 16-bit classics such as *Flashback* and *Zool*, Atari's console failed to gain traction. Even a later CD-ROM add-on couldn't inject life into the system and it was eventually discontinued in 1996.

The relatively short commercial life of the system, and the fact it was Atari's last console, has now made the Jaguar a rather desirable console from a collector's point of view and the system and games are now rising in price as a result. With the machine rapidly approaching its 25th anniversary it's the perfect time to discover Atari Corp's hardware swan song.

EDITOR'S CHOICE Tempest 2000

It's a clichéd choice for sure, but Jeff Minter's eye-blistering update of *Tempest* really is as good as everyone says it is. With a soundtrack that's every bit as intense as the game's blisteringly fast pace, *Tempest 2000* is an astonishingly good tube shooter that not only highlights the strength of Dave Theurer's original game design, but also Jeff Minter's deftness at taking those existing mechanics and refining them for a new system and more expectant gamers. A true triumph every Jaguar owner needs to own.

Amiga CD32

» **YEAR:** 1993
» **MANUFACTURER:** Commodore
» **COST:** £250 (launch), £150+ (today)

When the first AGA (Advanced Graphics Architecture) Amiga computers launched in 1992, Commodore realised it had a pretty solid gaming platform on its hands – it could comfortably claim to offer more than Sega or Nintendo. So for the third and final time, Commodore would attempt to enter the console market. Unlike the Commodore 64 Games System, the hardware wasn't outdated, and unlike the CDTV the price was reasonably affordable to the mass market. With a newly designed joypad and a (relatively) compact grey case, it looked to be a viable contender.

The system launched to a solid reception in Europe in September 1993 and quickly amassed a large software library, though the bulk of this was comprised of legacy Amiga games ported to CD for a quick profit. Although the console dominated UK CD software sales during its short life, overtaking PC CD-ROM and Mega-CD game sales, it wasn't enough to save Commodore. The company went bankrupt in 1994 and with nobody to manufacture or advertise new units, the CD32 faded into irrelevance. When Escom purchased Commodore and the Amiga technology later that year, it declined to support the CD32 – a sensible move, given the impending arrival of the PlayStation and Saturn. ✱

EDITOR'S CHOICE Litil Divil

If you're going to pick up a brand-new CD-based console, you want something flashy with which to show it off to your jealous friends, and this action adventure game fits the bill nicely. Your goal is to explore a dungeon, avoiding traps and beating games rooms in order to get treasure and escape to the next stage. The cartoon graphics are colourful and feature some pretty incredible animation, and the CD soundtrack that accompanies the action is a nice touch. Add to that the lack of a floppy disk version, and *Litil Divil* is an ideal CD32 showcase.

Amiga CD32 Fact

■ Although not designed for expansion into a full computer, third-party peripherals exist that allow the connection of a hard disk drive, floppy disk drive, keyboard and other accessories needed for the equivalent function of an Amiga 1200.

PROCESSOR: 32-BIT MOTOROLA 68EC020 CPU (14MHZ)

RAM: 2MB MAIN MEMORY

GRAPHICS: AMIGA ADVANCED GRAPHICS ARCHITECTURE (256 COLOURS INDEXED MODE, 262,144 HOLD-AND-MODIFY MODE, FROM A PALETTE OF 16.7 MILLION, 320X256 RESOLUTION)

AUDIO: 4X 8-BIT PCM CHANNELS

OPERATING SYSTEM: AMIGAOS 3.1 (1MB ROM)

MEDIA: CD-ROM (UP TO 650MB)

STORAGE: 1KB EEPROM

Super Game Boy

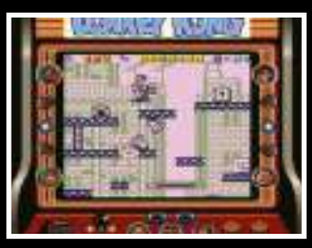
» **PLATFORM:** SNES » **RELEASED:** 1994
» **COST:** £49.99 (LAUNCH), £10+ (TODAY, UNBOXED), £15+ (TODAY, BOXED)

After five years of dominating the handheld console scene, there was only one market left for the Game Boy to conquer: the home. While the Super Game Boy didn't quite hit the world-conquering heights of the portable machine, it did allow millions of SNES owners the opportunity to play some rather excellent games they previously didn't have access to. There were good reasons to do so, too – displaying the games on a traditional TV rather than the Game Boy's LCD screen completely removed all of the display blurring problems that hampered fast-scrolling games on the portable machine. Limited colour support could be added to every game, and certain titles added extended support for the peripheral, allowing for more complex colour schemes and customised border illustrations.

As good as it was, the Super Game Boy wasn't perfect – the device ran ever so slightly faster than an actual Game Boy, and didn't include a port for link-up communications with another console. These issues were rectified by the later Japan-only Super Game Boy 2. The device proved popular, though, and Nintendo would later return to the same concept of handheld games at home with the Game Boy Advance Player for the Gamecube. *

ESSENTIAL GAME **Donkey Kong**

One of the very first games to be enhanced for the Super Game Boy also happens to be one of the very finest. What initially seems to be a straightforward conversion of the arcade game turns into an all-new puzzle platformer, and sparse visuals give way to carefully colourised graphics. As is the case for most great Game Boy games, it succeeds on its own terms and doesn't need a TV or anything else to succeed. All the same, adding them doesn't hurt at all, and this is arguably the best way to experience a classic arcade revival.



Super Game Boy Fact

■ Certain games from before the Super Game Boy's launch were given special palettes within the Super Game Boy hardware – these include *Metroid II: Return Of Samus*, *Kirby's Pinball Land* and *Super Mario Land 2: 6 Golden Coins*.

Sega Saturn

» **MANUFACTURER:** SEGA » **YEAR:** November 1994 » **COST:** £399 (UK launch), £15+ (UK today - unboxed), £30+ (UK today - boxed)

Sega had the pick of the pack when following up the Mega Drive – the company was offered both the 3DO technology and the Silicon Graphics Inc. architecture that powered the Nintendo 64, as well as the chance to collaborate with Sony. Instead the company went down its own path, placing its faith in its own hardware engineers. The result was the Saturn, a complex piece of hardware featuring two processors, two video chips and a custom sound chip. While this unusual arrangement delivered a high level of theoretical performance, it came with real downsides as the hardware was expensive, and programmers struggled to grasp its idiosyncracies.

Despite some excellent games, the Saturn's drawbacks kept it from repeating the success of its predecessor on the international stage. However, it became a popular machine in Japan and gained a hardcore following among import gamers as a result, becoming well known for its excellent conversions of 2D arcade games, particularly shoot-'em-ups and fighting games, as well as original RPGs. So while the Saturn wasn't the success that Sega had hoped for, it did find an audience that appreciated its strengths, and the lessons it taught would prove invaluable in designing the Dreamcast. *

Hardware Fact

■ The Saturn was the only console of its generation to come with built-in memory for saving games. However, it depends on a CR2032 battery, so it's worth getting a memory cartridge anyway.

RAM: 2MB MAIN, 1MB VIDEO, 512KB AUDIO

PROCESSOR: DUAL HITACHI SH2 (28.6MHZ EACH)

OPERATING SYSTEM: SEGA SATURN BIOS

FORMAT: CD-ROM

TOTAL SOLD: 9.5 MILLION

EDITOR'S CHOICE NiGHTS Into Dreams

As an original 3D game, *NiGHTS* might not appear to embody the things that endear the Saturn to its fans. However, look beneath the surface of Sonic Team's first venture away from its mascot and you'll see Sega's arcade design at work, as *NiGHTS* is a hardcore score attack game at heart. What's more, Sonic Team gave the Saturn hardware an excellent workout. Each stage mixes 2D sprites and polygonal objects to great effect, and amazing graphical effects such as reflections and real-time environment warping put other games shame.

HOW THE PlayS

tation CHANGED GAMING

It was the console that arguably killed the arcades, but revolutionised the way we played at home. David Crookes looks at why, two decades on from its western launch, we shouldn't underestimate the power of PlayStation

In 2000, some six years after the PlayStation had launched in Japan and with the PS2 finding its way into the sweaty hands of smitten gamers, Phil Harrison, then senior vice president for Sony Computer Entertainment Europe, spoke retrospectively of the ambition of the console brand that shook the dominance of Nintendo and Sega to its foundations.

At this point in time, Sega was months off throwing in the towel as its acclaimed yet largely shunned Dreamcast flopped in the shadow of its Sony rival. The Nintendo 64 was about to be set aside in favour of the GameCube. Atari had long been cast into the wilderness as its final console, the Jaguar, was discontinued in 1994 and its name was on the verge of being sold by Hasbro Interactive to Infogrames.

But Harrison had a different company in mind when he reflected on the manner in which the PlayStation had cleaned up the opposition and made the fifth generation entirely its own. "We wanted it to become the Hoover of videogames," he said, of the aim to make the console late-comer a proprietary eponym. "And, in many ways, it has."

It is fair to say that no gaming machine up until that point had ever had the widespread, mass-market impact of the attractive, CD-playing grey plastic box of tricks that became the PlayStation, as controversial as that may sound. Countless amazing consoles had come before it, but none of them were able to truly break into the mainstream and ▶

» Two decades ago we would have never predicted how important this logo would become.

» Although it catered for two players out of the box, it was possible to add more pads with a Multitap.

MARTYN BROWN

VIDEOGAME DEVELOPER AND CONSULTANT

"Back then it was all about 3D and especially the T-Rex demo that was doing the rounds – but we had our greatest PlayStation hit with a 2D game: *Worms*."

none were able to say that, nine years and six months after launch, they had sold 100 million units.

"I think really, the legacy of the original PlayStation is that it took gaming from a pastime that was for young people or maybe for slightly geeky people and it turned it into a highly credible form of mass entertainment, really comparable with great legitimacy with the music business and the movie business," says Sony's current European boss Jim Ryan.

Yet how did a console made by an outsider make such an impact? How did it become so successful that the stars of its games would adorn the covers of fashionable magazines? And why do people talk of the period between 1990 and 2000 as the era of the PlayStation Generation when the console wasn't even around for a good third of that time?

The answer is about to unfold. "I think Sony did a fantastic job in presenting PlayStation as a brand new way of playing and making games," explains Nick Burcombe, the lead designer of seminal title *WipEout*. "Sony's message about how powerful the PlayStation would be prior to launch did enough to get gamers looking at them, even though Sega's Dreamcast also had 3D capabilities and used discs too. Dreamcast was a good console but the message was loud and clear: PlayStation was even better. The message worked well."

The story of the PlayStation's origin has been well told. It's an intriguing tale of two companies; Sony and Nintendo striking a deal in 1988 to create a CD-ROM add-on to the SNES that would use Nintendo "Super Discs". Sony went further and added support for Video CDs and it took advantage of its permission to create its own standalone console which it called the Play Station (note the space), a machine that allowed for the playing of both CDs and cartridge. Sony showed off its creation to great fanfare at that year's Consumer Electronics Show in Las Vegas in 1991.

PAUL RANSON

FORMERLY OF BIG RED

"Levels, cutscenes and music previously squished into carts could now be developed with panache and in a style that we thought emulated the movie business. PS1 for me was the proper start of the Hollywood style entertainment in the videogame business."

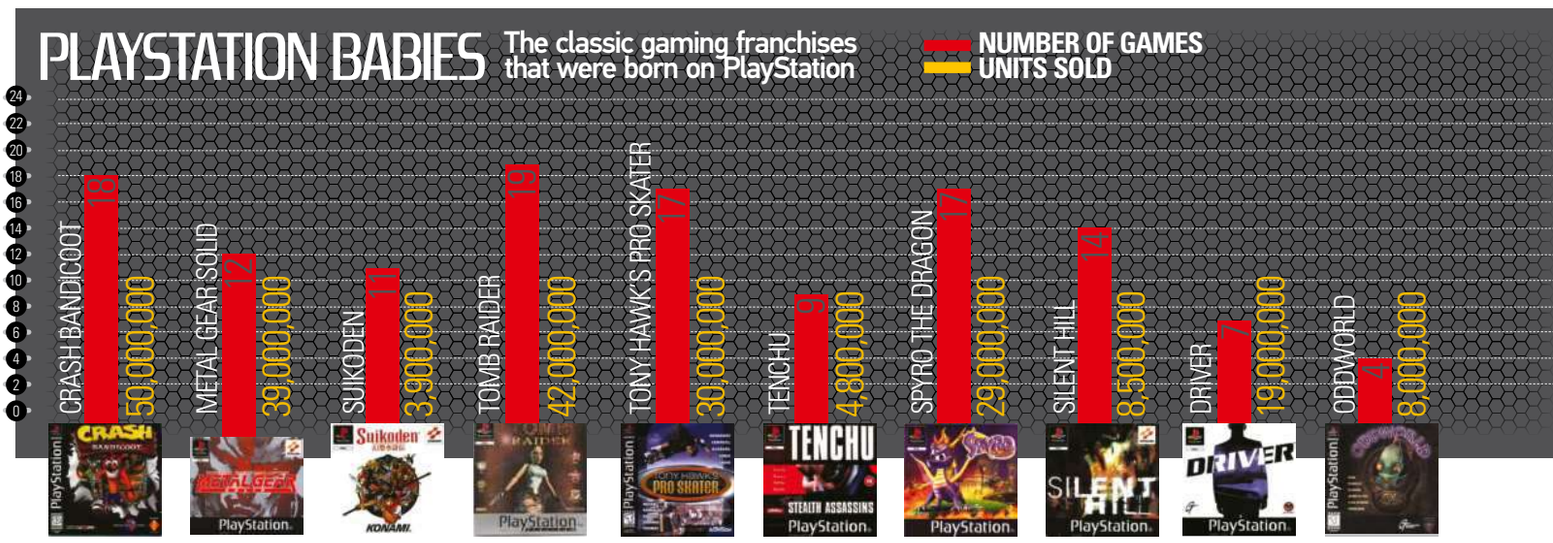
But within mere hours of the unveiling Nintendo got cold feet. It believed Sony could potentially pull the rug from under them and steal a portion of the industry so it cancelled the deal, announcing the day after that it was instead bringing rival Philips on board. Eager not to waste the huge amount of time invested in the project, Sony's president Norio Ohga ordered that development would continue without the experience of Nintendo. Ken Kutaragi who had begun his career in Sony's digital research labs was given the task of designing the machine, which Sony codenamed PSX.

Kutaragi pooled the resources of engineers who had been working on a geometric computer graphics engine called System-G that was capable of real time 3D texture mapping for broadcasting networks. By 1992 he had a prototype ready to show his bosses, but it wasn't an easy ride for Kutaragi and his team. There was much internal resistance to the idea, with

» *Nightmare Creatures* tapped into the survival horror genre.

» Cliff Bleszinski's favourite ever PlayStation game is *Jumping Flash*.

» *Pandemonium* was an early platformer that used 2.5D.



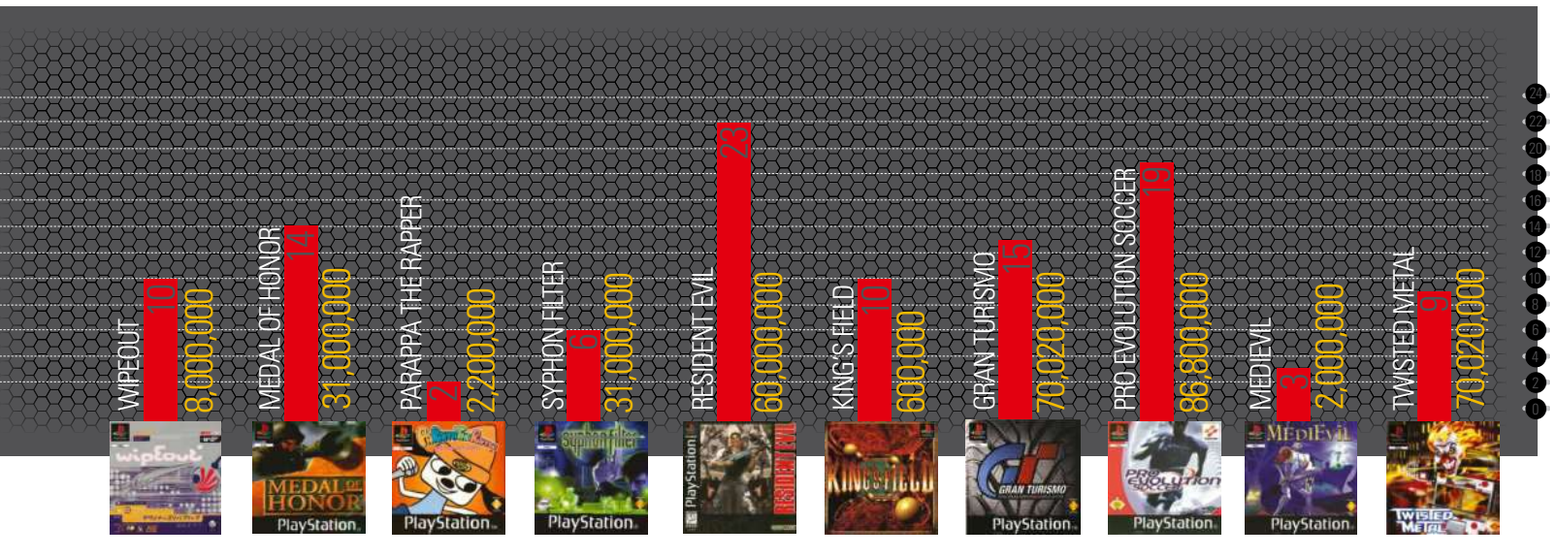
» The PlayStation's CD-ROM-based media ensured far higher capacity than cartridge-based consoles.

DARREN FALCUS
MANAGING DIRECTOR OF HIPPO ENTERTAINMENT
"The 3D technology and internal structure meant that it was a much easier technology to develop for."

» That's right, even the power button managed to look sexy on Sony's new console.

» Games required a memory card for saving, something that meant an additional cost for gamers.

» PlayStation's additional ports let Sony add various peripherals to the console.



Sony still, overall, reluctant to become a player in the games industry. Yet Ohga's anger at Nintendo was all that was needed to overrule any doubts.

For Sony's president, it was a case of winning at all costs. He kept the project on track, agreed the purchase of British development house Psygnosis (a startling move, given Japan's previous tendency to invest internally) and, with some refinement and a bit of design prodding, the machine was geared up for launch, first in Japan on 3 December 1994 and then in September 1995 in North America and Europe (selling for £299 in the UK). The console turned heads. "Two words: dinosaur demo," remembers Brian Baglow, writer of the first *Grand Theft Auto*, of the 3D graphic display Sony had slapped on a disc for those who had pre-ordered the console. "As soon as I saw the giant walking T-Rex, I was astonished and awed."

But the dino demo wasn't the only thing that stood out. The PlayStation, which would – thanks to a small redesign and relaunch in 2000 eventually become known as the PSone – had a shapely, comfortable games controller which did away with the flat design of other machines and replaced letters with shapes. It had external memory cards with 15 save blocks that added up to 128k (an idea copied from the Neo-Geo). It also had a slick appearance. More than all of that, though, it had games. Stunning games. And people wanted to play them.

DAVID DARLING

KWALEE CEO & FORMER CODEMASTERS BOSS

"It was the first proper 3D games console to gain significant market share and [Sony was] very active in supporting and encouraging developers. It was fun making games with 3D models and polygons rather than the 2D games we'd made for years on machines like the Sega Mega Drive."

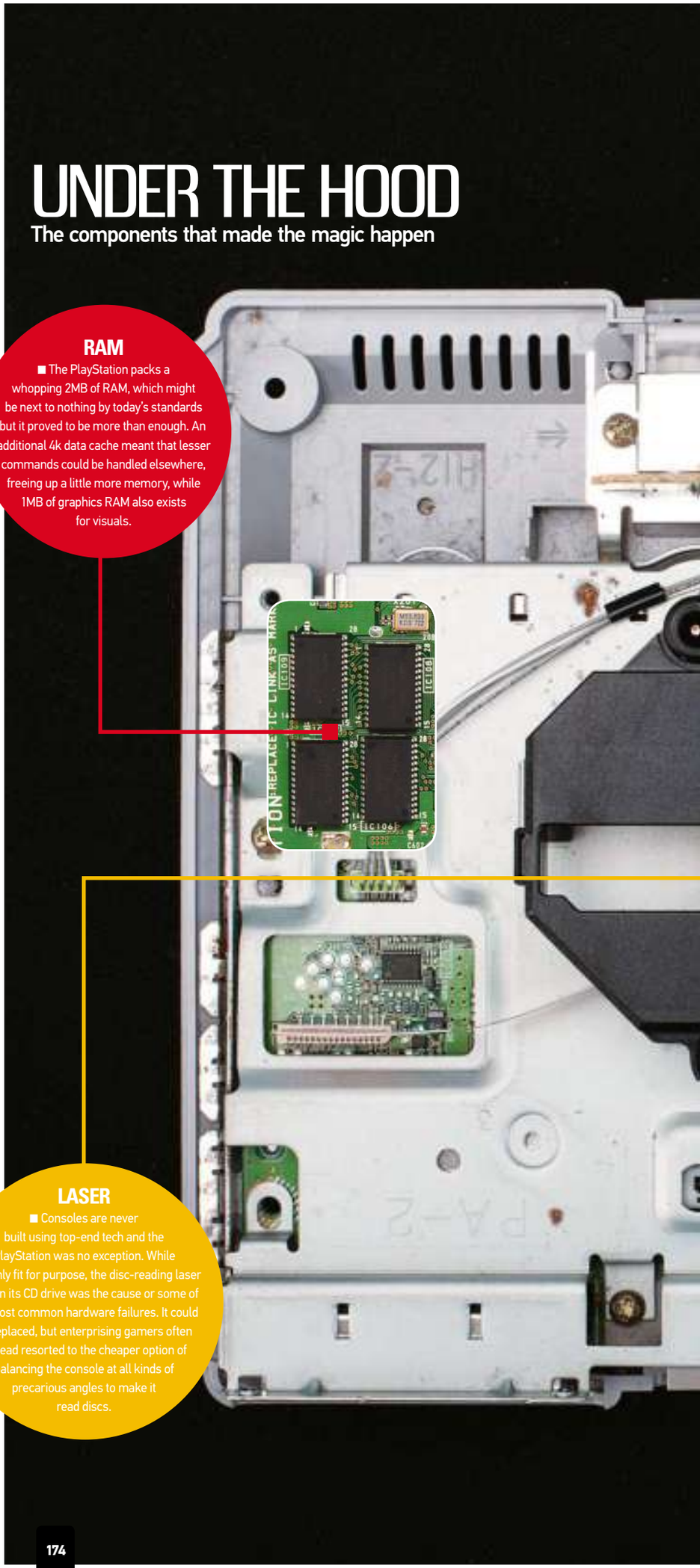
Eight games were available for the PlayStation on the first day but one truly stood out: Namco's *Ridge Racer*. It was an arcade driving sim with chunky 3D cars, wide tracks, catchy tunes and equally memorable speech; it was a title that laid down an ambitious marker and showed games could have just as much impact as music or film.

It was also a near-perfect version of the hit that had been attracting coins at the arcades and it helped

» There was no doubting the significant role that the tomb-raiding Lara Croft played in pushing *Tomb Raider* high in the charts.

UNDER THE HOOD

The components that made the magic happen



RAM

■ The PlayStation packs a whopping 2MB of RAM, which might be next to nothing by today's standards but it proved to be more than enough. An additional 4k data cache meant that lesser commands could be handled elsewhere, freeing up a little more memory, while 1MB of graphics RAM also exists for visuals.

LASER

■ Consoles are never built using top-end tech and the PlayStation was no exception. While certainly fit for purpose, the disc-reading laser used in its CD drive was the cause or some of the most common hardware failures. It could be replaced, but enterprising gamers often instead resorted to the cheaper option of balancing the console at all kinds of precarious angles to make it read discs.

MOTOR

■ That satisfying whirring sound when booting up a new game came from this x2 bad boy, capable of transferring data at 300kb per second. After extended use, the motor could wear out and result in disc read errors, while overuse of the swap trick (to play import games, naturally) could weaken and break the plastic spindle.

CONTROLLER/ MEMORY CARD SLOTS

■ Four front-mounted slots allow for up to two controllers and a pair of memory cards. The controller ports are capable of relaying information and commands from multiple controllers and not just one, as evidenced by the existence of the Multitap. Despite the existence of a second Memory Card slot, some games only allow use of the first.

TRANSFORMER

■ Some consoles use external transformers to keep both size and heat down, but the PlayStation had it all on-board which helps explain its size. Sony was able to shrink the console down for the PSone model in part by moving to an external power transformer on the plug lead rather than having it in the box.

CPU

■ Rocking a 32-bit R3000A processor clocked at just over 33MHz, the PS1 is capable of rendering around 360,000 polygons per second. It serves just as well for 2D games, mind, but few would deny that 3D was what made this console so exciting.

CHARLIE CHAPMAN
NET YAROZE PROGRAMMER

"There's no doubt that the move from cartridges to a CD format reduced the barriers to entry and led to the release of more games which perhaps wouldn't have made it before."

HOW SONY MADE GAMING COOL

The reasons PlayStation was such an important console

ADVERTS

■ It used to be that advertising agencies would target the same demographic as toy retailers when producing campaigns for games. But by making interesting and original shorts that broke free from that, Sony's marketing proved to generate both conversation and interest in the brand.

NIGHTCLUBS

■ Placing consoles running stylish and exciting games like *WipEout* in bars and nightclubs taught an entire generation one very important lesson – games aren't for kids any more, and there's a lot more to gaming than you might have thought.

GAMES OF SUBSTANCE

■ With so much more storage space, it wasn't just visuals that could be more impressive – worlds and mechanics could be far more intricate than ever before. Only a handful of 16-bit games lasted upwards of 20 hours, but PS1 RPGs would commonly come in closer to 100 hours.

PIRACY

■ What better way to hit the mainstream than to have games available for free? With the web in its infancy, blank discs constantly falling in price and several simple solutions for running unsigned code on PlayStation, piracy was undeniably a huge part of the PlayStation boom.

MATURE GAMES

■ The better graphics got, the more developers were able to use games to tell grown-up stories and faithfully cover topics that simpler visuals perhaps wouldn't do justice. Between visuals, audio and scale, we finally entered an era where games could move and affect players on a similar level to movies. This more emotional connection to games meant that they could be taken a lot more seriously as an entertainment medium.

CD FORMAT

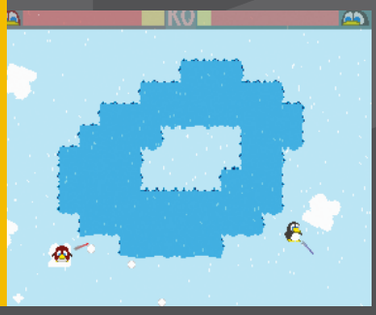
■ It used to be that taking a few games around to a friend's house would involve lugging around a bag full of chunky cartridges. With the rise of disc-based media, one game case could hold a collection, plus the format also allowed for better audio quality than older hardware could manage.

NINTENDO/SEGA

■ A lot of Sony's success came down to a fresh approach to gaming – its competitors had been butting heads for years, leading them to contest the same market. But this just allowed Sony's new audience to appreciate something new even more.

NET YAROZE

■ The Net Yaroze provided students and hobbyist programmers with a chance to make PlayStation games, opening up the traditionally closed console development scene. A small community of bedroom coders sprang up as a result.



3D GAMING

■ Clever coding allowed 3D (or 3D-style) visuals on some of the oldest hardware, but it was the scale on which the PS1 hardware was capable of rendering 3D worlds and environments that really blew us all away. Early polygon visuals haven't aged well, but it was so impressive at the time.

» With the tunes from *Parappa The Rapper* staying with players forever, little wonder it helped kickstart the whole rhythm-based genre.

» With a gorgeous opening that showed the power of the PlayStation and great moves, *Tekken II* was a revelation.

» Although it was an below-average release, *Porsche Challenge* didn't half look good.

Sony shift 100,000 PlayStations on the first day in Japan. Before long, impatient punters were splashing out £700 or more to import the console into Europe and the US and the momentum began to build. Those 3D capabilities were a major draw and suddenly gaming began to look more mature, moving away from the perception of kids playing in their darkened bedrooms to something trendy adults wanted to share while sitting on their sofa.

"The PlayStation introduced the idea of true 3D gaming to the living room and, beyond that, the mass market," says Cliff Bleszinski, whose first game *The Palace Of Deceit: Dragon's Plight* was released in 1991. "The PlayStation shifted the console from having an almost toy-like quality into the consumer electronics that are just as desired by 12-year-olds as they are by 35-year-olds."Key to this was getting developers on board and helping them through the transition from 2D to 3D. Before the PlayStation, creating 3D on consoles was no easy task but the PC had shown the possibilities with *Doom*, *Wolfenstein* and *Descent*.

The SNES, for instance, had a Mode 7 playfield which allowed for some pseudo-3D with games such as *Mario Kart* and *Pilotwings* but it could only simulate a single flat-textured plane. "There were a handful of games using the SuperFX chip for SNES, which was a coprocessor that accelerated 3D rendering on the SNES, but it wasn't a fully featured GPU as found in the PS1, and it was quite limited," explains Michael Troughton, who worked on the *Destruction Derby* games for the PlayStation while at Reflections.

"The consoles that were appearing weren't making life any easier. Sega Saturn was a powerful machine with 2 SH2 RISC CPUs and a number of dedicated coprocessors to handle audio, video, sprites and polygons but it was notoriously difficult to program for," says Michael. "Programmers had little experience with multi-processsing and it hindered them. The PlayStation suddenly opened 3D up to a much wider range of developers, with its custom graphics processor and geometry engine in hardware.

"In fact, I remember thinking it was amazing that the PS1 had the same CPU as the £5,000 Silicon graphics workstation we were using to build the 3D environments. Now almost any programmer with a minimal amount of basic maths knowledge could write a 3D game."

MARTIN HOLLIS
WORKED ON GOLDENEYE:007

"Sony cultivated the machine's association with music and club culture. Without this it is difficult to imagine *Dance Dance Revolution*, *SingStar*, *Guitar Hero*, or *Rock Band*."

Fuelled by Namco's racer, sped along by *WipEout* and propelled to a higher platform by *Jumping Flash* (which Cliff Bleszinski says remains his favourite game), 3D became the PlayStation's hallmark and it led to an insatiable demand for three-dimensional titles. Most releases for the console were 3D (the occasional *Oddworld* game aside) and the likes of *Tekken* and *Battle Arena Toshinden* continued to feed the appetite.

This changed videogaming in another way. Given that 3D was more complex, larger development teams were needed. Programmers and artists who struggled to work with 3D found themselves floundering as the new way of presenting games became expected on all platforms, and not just the PS1. "The switch to 3D was a ton of work and it required the relearning of new skills," laments one half of the Pickford Bros development team, Ste Pickford, who designed a kids cartoon game called *DragonTales: Dragon Seek*. "The massive 512 MB CDs we had to fill meant tons more graphics. It was more a feeling of 'Aaargh!' than being blown away."

Sony initially refused to grant concept approval of any 2D game in its bid to use the beauty of graphics to attract a new breed of gamer. "It meant all game developers had to make 3D games when we were all new to it. I think this sent games backwards for a while because the PlayStation had power to burn for 2D stuff and there could have been some amazing 2D games as we all had the skills and tools to make them," continues Ste.

But as time went on developers gradually started to pick up the skills. "I've definitely experienced the hard work that comes with adapting game development to each new generation of consoles," says Michiteru Okabe who produced the art and graphics for *Armoured Core: Master Of Arena* in 1999 and has, more recently, been the producer on *Resident Evil Revelations 2*. He recalls trying to reuse textures to make a massive stage, running out of memory and redesigning it all at the last minute.

Indeed, Paul Hughes, who was working for EA when the PlayStation was launched, tells of Sony's excellent tools, documentation and all-important development kit. Sony also revolutionised the technical requirements checklist, and this step in turn helped to develop a pretty solid barrier to entry from a quality perspective.

"I found the initial transition pretty painless," he says. "I'd been writing 3D engines since the late Eighties, so I had a reasonable grasp of rendering pipelines – if anything, it was mind-numbing that it had hardware that would draw textured and lit triangles for me rather than having to obsess about every clock cycle of a software triangle rasteriser. From a visual effects perspective, it had proper, honest-to-goodness alpha blending which really helped up the ante for particle/trail/post effects."

Despite the advancements, however, the mainstream press cast doubt on the companies that were newly emerging to take a slice of the digital pie. In May 1995, the *New York Times* ran with the headline "Video Game War Looms In Hardware" and it spoke of the challenge to be dominant in the $4 billion videogame market by "introducing better, faster machines with 32-bit microprocessors that can deliver three-dimensional graphics and quicker and more intricate action than the current 16-bit machines."

Sony, the 3DO Company, and Sega were scorned for offering what were now seen to be comparatively expensive machines. "Nintendo of America and the Atari Corporation are producing machines that retain the familiar cartridge format and sell for considerably less," the piece continued, neglecting to focus on what was really important…

It was the CD-ROM drive that was so important for Sony (which, after all, had invented the CD format in 1982 in collaboration with Philips) and it was, as we saw, the entire reason the company had got involved into the videogame industry in the first place. "Sony was our key partner when we were developing the first CD-ROM games on Genesis," Tom Kalinske, the former CEO of Sega of America tells us, "Back then, none of us knew how to develop on the optical disc media but we all thought it could be great – the future for game machines." It helped to lower the cost of game production,

JAMES RUTHERFORD
NET YAROZE PROGRAMMER WHO LATER WORKED ON STUNTMAN AND DRIV3R

"Net Yaroze added a whole new dimension to the PlayStation and it was great to be able to create games on something that was current and powerful. Having the games on a magazine cover disc was a major incentive for us."

STEWART GILRAY

CEO OF JUST ADD WATER

"You'll have to remember that 20 years ago games simply didn't do 3D at home, at least not as well as the arcades did. So when we got our Japanese import PlayStation at launch with *Ridge Racer*, we all sat around with the joypad in our hands, loaded it up, and raced like we were playing the arcade version. *That* blew us away."

» The PlayStation's pad went through numerous revisions in its live, this one introduced analog sticks.

DUALSHOCK AND AWE

The evolution of the PlayStation pad

PLAYSTATION CONTROL PAD

■ The original controller and our first taste of those iconic button symbols. Also notable for popularising the use of four shoulder buttons, where most major pads would only use two.

DUAL ANALOG

■ With players wanting more precise control for 3D gaming, the Dual Analog was a prayer quickly answered. First-person games could finally be played with tight movement.

DUALSHOCK

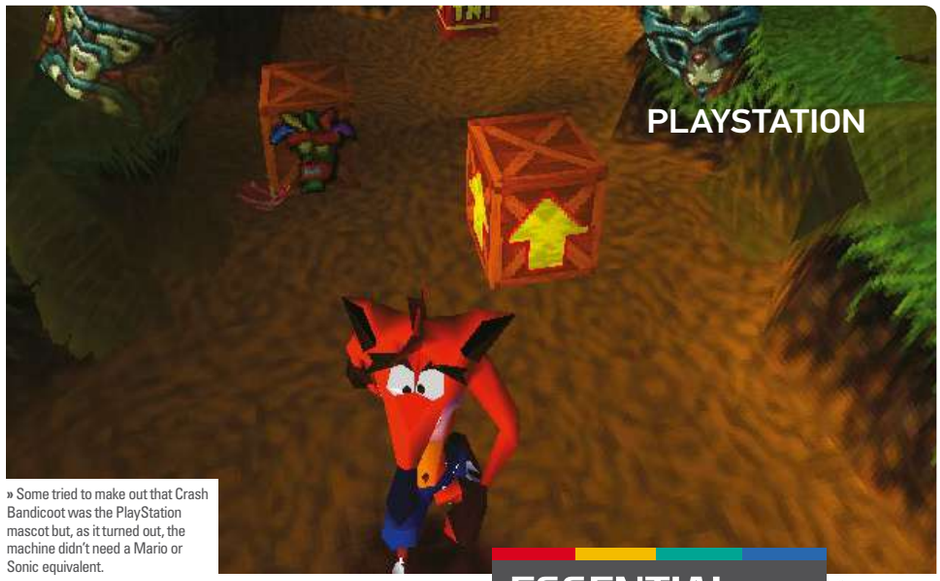
■ Effectively the same as the previous controller, with motors fitted into each handgrip for vibration. It also brought two additional buttons, namely L3 and R3 mapped to clicking the analog sticks.

DUALSHOCK 2

■ While cosmetically and technically very similar to the original DualShock (to the point where originals would work on PS2 as well), there was one major change: every major button was analog rather than digital.

DUAL ANALOG

■ With players wanting more precise control for 3D gaming, the Dual Analog was a prayer quickly answered. First-person games could finally be played with tight movement, while inventive devs could create quirky uses for a pair of sticks, as seen with launch title *Ape Escape*.



» Some tried to make out that Crash Bandicoot was the PlayStation mascot but, as it turned out, the machine didn't need a Mario or Sonic equivalent.

ensuring huge amounts of cash was not tied up in pre-booked cartridge stock that may not have sold. "The move to disc was a huge but natural and necessary change," says Dave Ranyard, the current London Studio boss of SCEE. "Prior to that, we had cartridges and before that dedicated machines, but the ability to store tons more data for our games improved them no end, graphically, musically, and in terms of scope. Disc is a very cheap and efficient method of distributing lots of data."

The disc also allowed for the streaming of a lot of data. Movies could play back in 16-bit colour thanks to the dedicated MDEC hardware. "Then of course you had CD quality audio that you could stream off the media rather than a MIDI track with less than stellar instruments," says Paul Hughes. "Everything about it just oozed quality – right from the boot-up sequence."

PlayStation cemented CD soundtracks as the standard throughout the industry. Until that point most gamers were content with the chip-music that consoles offered, excellent as it was. "But after people started hearing tracks they recognised by the Chemical Brothers and Leftfield in their games, chip-music became unacceptable really fast," says Colin Anderson, who headed up the audio team at DMA Design from 1993 to 2000 before leaving to create Denki, the world's first digital toy company.

"It kicked off some sizeable investment in audio development as teams struggled to switch from chip-music to full CD-quality soundtracks," he continues. "I enjoyed a front row seat on that particular roller-coaster as we were working on the audio design for the game that would eventually become *Grand Theft Auto.* When we started development we fully expected to be using chip-music, but within six months it became clear we needed to up our game if we wanted to compete with all the other great games that were being released. *WipEout* was the straw that finally helped me convince [boss] Dave Jones that DMA needed its own music studio."

The PlayStation tapped into modern-day culture like no other games console had ever achieved before, positioning itself in style mags and persuading celebrities to grab a joypad in the wake of videogames' new cool status. ("I was getting carried away playing *Tekken II* and *Tomb Raider* for hours on end," excused England goalkeeper David James when he conceded three times against Newcastle in 1997.)

But music and the PlayStation, in particular, went hand-in-hand. Developers started to experiment with audio, putting it at the heart of titles such as *Vib-Ribbon* and *PaRappa The Rapper* which led to rhythm-based game crazes such as *Dance Dance Revolution.* They also tapped into the Nineties music vibe of techno and house. The PlayStation ingratiated itself with the growing underground club culture and the sound of big names such as Orbital, Leftfield and The Future Sound Of London.

In Liverpool, where *WipEout* was made, the emerging super-club Cream was positively surreal. Bass pounded, strobes flashed, people danced and then, they stopped, they stared, they gravitated towards the PlayStation pods that had been placed there, just as they had in dozens of other clubs up and down the country, and they played. "We knew something significant about gaming had changed," continues Nick Burcombe, who now heads up Playrise Digital. "It was pretty amazing really."

In London, New York, Tokyo and hundreds of cities in between, clubbers were relaxing between DJ sets with a few rounds of *Virtua Fighter* or *WipEout,* which was the first game to incorporate licensed music. "PlayStation was bringing gaming out of the bedroom and into the mainstream in a way no other company had," says Colin. "That's what changed gaming forever. It wasn't the hardware."

Aggressive infiltration of this kind, together with an approach to marketing that was wildly different to much of what had gone before was repositioning

ESSENTIAL EXTRAS

Six of the best Sony peripherals

x5 images © Evan-Amos

POCKETSTATION

■ Effectively a portable device akin to the Dreamcast's VMU, PocketStation never saw the light of day outside of Japan. Over 50 games supported this interesting device, which plugged into the console via the memory card port and had its own LCD screen.

MEMORY CARD

■ While cartridges sometimes allowed game data to be saved to internal memory, the CD format offered no such luxury. Sony's solution was a proprietary storage solution – a 15-block 1MB memory card to which game data could be saved.

MULTITAP

■ Two controller ports was enough for most games but to fully enjoy something like *Micro Machines V3* (whose predecessor had additional ports built into the cartridge itself) or Bomberman, you'd need more. Enter the Multitap.

GUNCON

■ Light gun arcade games were all the rage around the time the PS1 rose to power, and this accessory, originally released to allow *Time Crisis* to be played at home, proved to be one of the most accurate home approximations of the arcade experience.

GAMESHARK

■ Plugging into the console's parallel port, these cheat devices allowed game code to be modified to activate cheats, alter elements of a game or even to access content that wasn't in the final build, including additional scenes in *Final Fantasy VII.*

DUALSHOCK 3

■ As costs fell and tech improved, Sony was soon able to reintroduce rumble to the Sixaxis template and the DualShock 3 was born. It quickly superseded its forerunner as the PS3 standard and Sixaxis was discontinued in mid-2008.

DUALSHOCK 4

■ The first full evolution in the life of the DualShock, the PS4 pad adds many new features. Sixaxis motion control remains, with a rear-mounted light bar allowing a camera to better place the handset for accuracy. It also adds a touch pad and Options and Share keys.

» *WipEout* was one of the UK launch titles for the PlayStation and it took both the gaming and the wider world by storm.

gaming as a cool pursuit. "At the time of its launch I was a student and I'd always been into videogames from the early days of arcades," says Dave. "I would hang around playing *Space Invaders* and *Galaxians* and until the PS1 came out, that kind of thing made me a geek. But this console changed all that – suddenly videogames were cool – not just acceptable, but actually club culture cool. With a soundtrack from the coolest techno and dance DJs, videogames became a part of sub-culture. And it led to a more mainstream acceptance of consoles in general."

It helped the console to continue to attract adults, a strategy that Sega had already begun but Sony seemed to perfect. One of the keys to this was Steve Race, boss of Sony Computer Entertainment of America. Race had worked under Kalinske at Sega and he had no problem competing with his former workers (indeed, he infamously took to the stage at the inaugural E3 in Los Angeles just after Sega had announced the Sega Saturn at a price point of $399, muttering one word – "$299" – and walking off to great applause).

"Steve knew our strategies of going after an older audience and being edgy and competitive in advertising," continues Tom Kalinske. "He knew we would do everything we could to come across as the superior 'cool' brand, and he did this very well. But I don't think Sony did anything other than copy lots of aggressive marketing that we had done at Sega initially with Genesis." And yet, Sony took its marketing to a different level.

Although ads did target children (*Croc* was plastered on bus shelters near schools) titles like *Resident Evil* were certainly aimed at an older audience and developers did all they could to grab their attention. The disgraced former publicist Max Clifford used the tabloid press to whip up a publicity frenzy for controversial titles. Games such as *Grand Theft Auto* and *Cool Boarders 2* made the papers by talking of "having to get higher than last time" in ads (Darren Carter, the then senior product manager at SCEE, defended this move, saying, "the wording is genuinely how snowboarders talk").

One of the most memorable adverts, though, was *Double Life* which had been created by ad agency TBWA. Written by James Sinclair, it became a classic, its lengthy monologue showcasing eccentric individuals describing what they did in their free time. "I won't deny I've engaged in violence, even indulged in it," says one, to the tune of Fauré's *Requiem* as he describes – the viewer discovers later – his fantasy PlayStation life. In 2007, the advert, directed by Frank Budgen, was accepted into the Clio Hall of Fame.

Sony's brief was to the point. It wanted to "break out of a core consumer base of geeky pubescent teenage boys by bringing a broader acceptability and dignity that was absent from the sector." Sinclair cross-cast the advert, showing policemen breaking the law and vicars committing all sorts of sins ("this got softened somewhat – inevitably," he tells us). The idea was to put people at the centre of gaming. The advert contained no gameplay footage or screenshots.

"People's imagination is the most powerful element of the gaming experience, more than the graphics, sound effects, atmosphere and so on. That's what really puts them in the moment," James says of the ad that was shot for television and cinema. "I'd thrown in some off-the-beaten-track words and phrases like 'hoi polloi' to give the piece a sort of anachronistic vibe. It gave it a timelessness that has served it well over the years."

» As the sequel to *Flashback*, the action-adventure *Fade To Black* only made it to the PlayStation (and PC).

And yet, away from the camera, Sony was putting games centre stage, signing exclusive deals for the best games, among them *Tomb Raider*. The second and third titles in the series made the PlayStation their console home and it led to increased sales. "I remember getting our hands on the original *Tomb Raider* when we were working on the original *GTA* and thinking, 'Oh f***',' says Brian, on the impact the game had.

But it wasn't hard to persuade companies to climb aboard. "Behind the scenes, Sony offered developers a better deal than its competitors," says David Banner who worked on *Tomb Raider* as a tester. "It gave better royalties and it promoted games well. It understood that having the best console relies on having content so the more developers it got on board the more titles it'd have for the customer to digest. Nintendo and Sega primarily relied on their titles being developed in-house, whereas Sony saw the potential of opening up development to third party developers."

Those third-party developers seized this opportunity, understanding what a console with such a large user base could offer. Programmers and artists looked for new ways to take advantage of 3D and they also sought to tap into current trends such as extreme sports, generating games like *Tony Hawk's Pro Skater* and leading to many a big budget PlayStation event. Over the course of the PlayStation's lifetime, the age of developers also began to rise, with graduates seeing a stable career path in the industry. "Two of the guys on the *Destruction Derby* team were still in their teens – that would be unheard of today," says Michael.

That said, Sony also came to embrace smaller, independent developers by releasing a development kit called the Net Yaroze. The problem with previous consoles was the cost of developing for the systems. They were, by and large, closed shops. But with Net Yaroze, a small outlay was enough to bag a kit and start making games, some of which ended up on the cover disc of the *Official PlayStation Magazine,* which,

» *Ridge Racer Revolution* was the chunky car sequel to *Ridge Racer* but the gameplay remained entirely unchanged.

STEVE LYCETT SUMO DIGITAL

"To understand the impact, you've got to remember that when we first got our hands on the PlayStation hardware it was a revelation on a number of fronts. First, it was the first proper dedicated 3D console – this is in a pre-3DFX/PowerVR accelerated PC graphics era, too. So the results you could achieve quickly and easily were way in front of anything else. Next, having spent so long working with limited cartridge budgets, having a whole CD you could fill and plenty of memory (2MB was a lot back then!) opened the door to bigger levels, better audio, cutscenes and really going to town on the presentation as much as the game. You could say any one of those components existed individually, but it was the PlayStation that pulled it all together in one powerful and complete package."

THE 20 MOST IMPORTANT MOMENTS IN PLAYSTATION HISTORY

SONY GOES IT ALONE

1 After talks with Nintendo to develop a disc-based add-on for the SNES, Nintendo shockingly revealed a partnership with Philips, which ultimately came to nothing. Sony's work was not in vain, however – the groundwork for PlayStation had already been done.

ARCADE-PERFECT PORTS

2 Flick through old magazines and you'll find the term 'arcade perfect' applied in so many inaccurate ways. With *Ridge Racer* and the many coin-op ports that followed, though, it really *was* true a lot of the time.

CD CAPACITY = BIGGER GAMES

3 Cartridges could only allow a certain amount of data to be stored, with no easy way of swapping between them. The compact disc medium changed this, allowing for console games that spanned as many as five discs.

PLATINUM PRICING

4 With gaming growing more popular, Sony made the smart move of adding its most successful games into the Platinum range, slashing prices to help them shift more copies.

ANYONE CAN MAKE GAMES

5 The Net Yaroze remains one of the coolest hardware iterations ever, a developer console that effectively anyone was able to create games for. The best of these would be showcased via the official mag's demo discs.

FINAL FANTASY JUMPS SHIP

6 The only way for something as epic as Square's RPG series to evolve was to go 3D and to go bigger, a combination not possible on carts. With Nintendo still backing the old format, Square had little choice, and it was a huge coup for Sony.

MARKET AWARENESS

7 Smart advertising made PlayStation the coolest brand in gaming in the space of a few relatively simple campaigns – Sony managed to build the idea of gaming being something more than just a nerdy pastime in mere months.

JUST DANCE

8 Cheap plastic dance mats are nothing compared to the glorious coin-op stages (assuming they work properly) upon which the best perform, but bedroom pop stars didn't care. It just felt good to step on arrows.

SWAP TRICK

9 Who *didn't* know the method of getting import games and even illegal copies running on a PS1? Broken spindles and motors were common, but you could play whatever you wanted.

SMALLER, YET SMARTER

10 A revised PlayStation known as the PSone launched in 2000, with its little form and more cost-effective use of components allowing Sony to sell it for less than the original console. It also did away with many popular piracy methods.

GTA3 INVENTS A GENRE

11 DMA's silly crime sprees were fun, but *GTA* only really shot to notoriety when it contained realistic, free, open-world sociopathy.

DON'T HATE THE PLAYER, HATE THE GAME BOY

12 Sony's plan for Vita was simple – take on Nintendo's handheld dominance by offering console-quality games on the go. Despite huge *Monster Hunter*-fuelled success in Japan, neither PSP nor Vita really managed to break the western market, but Sony still hasn't given up trying just yet.

DVD READY

13 Choosing DVD as a primary format for games was risky, but it also placed the PS2 among the most affordable DVD players available during the format's boom. Want a DVD player? Might as well get one that plays games too...

LEAP YEAR BLUES

14 Original PS3 models were hit by a bizarre bug on 1 March 2010 when an error on the console's internal calendar assumed incorrectly that 2010 was a leap year and proceeded to implode on itself.

LIGHTS, CAMERA...

15 The rise of EyeToy led many (including other modern major platform holders) into believing motion control was the future. Everyone got that wrong, but it was fun while it lasted.

$599

16 The announcement that the PS3 would be worth getting a second job to pay for didn't do all that much to help its early performance – Sony had to do a lot of work to get it even close to the 360 in terms of units sold.

PSN HACKED

17 In April 2011, Sony's PSN network was hacked and the details of around 77 million users compromised in the process. The downtime lasted for several weeks and while something of a disaster, it clearly taught Sony some valuable lessons as it hasn't fallen foul to a similarly devastating attack since.

PS PLUS

18 With Microsoft hiding online play behind a paywall, Sony played it smart – keep online play free (at least on PS3) and instead offer free games for recurring subscribers. The model works, and even third-parties are getting involved now.

ANYTHING YOU CAN DO...

19 Sony's confidence in countering every poor decision made by Microsoft was an easy highlight of E3 2013, but the brazen approach to everything – including pricing – easily explains Sony's return to prominence for this new generation of consoles.

LOVING THE INDIES

20 Whatever you think about Sony's triple-A PS4 line-up, its selection of indie and retro titles is superb. From *Resogun* and *Oddworld* to *Grim Fandango* and *Final Fantasy VII* (a PC port, sure, but it's better than nothing, right?), Sony is doing its bit to keep old-school gameplay alive.

LAUNCH GAMES REVISITED

Sony's PlayStation launch games are now two decades old. We were keen to see how they still fare...

KILEAK: THE BLOOD

"This failed to impress gamers 20 years ago, and it's still a shambles today. The lo-fi visuals and clunky controls are rather charming, but the deathly dull gameplay creates a miserable gaming experience"

DARRAN

NBA JAM: TOURNAMENT EDITION

"Visually, this isn't too much of a jump up from the previous generation, but as far as gameplay goes, this still stands up today as a great game to play with friends, even if I am still terrible at it even all these years later..." **JON**

STREET FIGHTER: THE MOVIE

"This is a great game for all the wrong reasons. The animation is laughably poor, while the difficulty level is all over the place. It's nowhere near as dull to play as *Toshinden*, but it remains a disappointingly average brawler" **DARRAN**

LAUNCH GAMES*

- **A-TRAIN IV EVOLUTION** JAPAN
- **BATTLE ARENA TOSHINDEN** US/UK
- **CRIME CRACKERS** JAPAN
- **ESPN EXTREME GAMES** US
- **GOKUJÖ PARODIUS DA! DELUXE PACK** JAPAN
- **KILEAK: THE BLOOD** US/UK
- **MAHJONG GOKU SKY** JAPAN
- **MAHJONG STATION MAZIN** JAPAN
- **NBA JAM: TOURNAMENT EDITION** US/UK
- **NEKKETSU OYAKO** JAPAN
- **POWER SERVE 3D** US
- **THE RAIDEN PROJECT** US
- **RAPID RELOAD** UK
- **RAYMAN** JAPAN
- **RIDGE RACER** US/UK
- **STREET FIGHTER: THE MOVIE** US/UK
- **TAMA** JAPAN
- **TOTAL ECLIPSE TURBO** US
- **WIPEOUT** UK

*IT'S WORTH NOTING THAT EVEN SONY UK DOESN'T HAVE COMPLETE LISTINGS, BUT RESEARCH SUGGESTS THE ABOVE LIST IS CORRECT

RAPID RELOAD

"It's not quite as good as *Gunstar Heroes*, which it is clearly trying to imitate, but it's still a great blaster that's probably more appreciated now than it was back then" **NICK**

CHARLES CECIL

REVOLITION SOFTWARE BOSS AND CREATOR OF BROKEN SWORD

"The PlayStation oozed sex appeal. Sony's inspired marketing quickly made videogames hip. And the team at Sony were amazing – a small team of inspirational, creative people who were re-defining the industry: re-writing the rule book. The two *Broken Sword* games were incredibly well received, being voted amongst the top ten best PlayStation games by *Official PlayStation Magazine* readers. PlayStation launched a new epoch."

BATTLE ARENA TOSHINDEN

"I'd probably have been thrilled at the time with this, but while it looks the business it just doesn't play that well. It's easy to see how *Tekken* became more popular..." **NICK**

RIDGE RACER

"Riiiiiidge Raaaaaaacer! Yes there's only one track, but what a track! It still controls exceptionally well, while the jaunty music and challenging track design will keep you chasing those top times"
DARRAN

JUMPING FLASH

"This was probably just as odd a game back then as it is now, but I can imagine that for its time it really stood out from anything else. The soundtrack is definitely worth a mention as well" **JON**

▶ thanks to the number of demos it would give away, began to reach a sales figure of over 450,000.

"We used the Net Yaroze to teach console programming at the University of Abertay in Dundee at a time when educational establishments could not get their hands on the full development kit," says Professor Ian Marshall, whose department at the Uni received a staggering 40 Net Yaroze kits for its computer games technology Masters and Undergraduate students. "It was close enough to the real thing that transferring from Net Yaroze to the full dev kit did not take much re-learning."

As a result, scores of student programmers were able to write tight code to run on a PlayStation and it opened up a vibrant community of home developers across the world. Just as the Spectrum and BBC Micro created many of the leading UK games developers of the Eighties, so the Net Yaroze contributed to the development of the independent and studio developers we have today. Mitsuru Kamiyama created the RPG *Terra Incognita*. He ended up working on the *Final Fantasy* series which, despite having made its debut on the NES, became one of the PlayStation's most popular titles.

Final Fantasy was one of a large number of games that made the PlayStation such an iconic hit. While Nintendo continued to concentrate on Mario and Sega

PATRICK BUCKLAND

CEO, STAINLESS GAMES

"I was actually involved with them pre-launch. Sony was determined not to fall into the same trap as the CDi and the 3DO and try to be everything to all men. They were clearly a games console through and through, not a multimedia device. They also took the start that Sega had made with the Mega Drive and made the PlayStation a games console that you didn't feel embarrassed of."

on Sonic, Sony had no real mascot despite desperate attempts by some players and media to intrinsically link Crash Bandicoot to it. Instead it heralded an eclectic era of massive franchises that ran and ran, from *Resident Evil*, *Tomb Raider* and *Tekken* to *WipEout* and *Grand Theft Auto*.

In May 1998, Chris Deering, then president of Sony Computer Entertainment Europe, said five or more games were being sold per PlayStation – "at least 50 per cent better than it ever got on 16-bit". Then, the average age for a PlayStation gamer was 22. It was keeping the Eighties kids playing while attracting brand new audiences.

Sony continued to tinker. It advanced on the N64's Rumble Pak with the DualShock pad in 1998 bringing vibration feedback and it introduced a Platinum budget range for older games that had sold more than 150,000 copies, which included the likes of *TOCA*, *Die Hard Trilogy*, *Fade To Black*, *Time Crisis*, and *V-Rally*. The PlayStation was also keeping pace: games made at the end of the PS1's life were far more visually stunning than those at the start.

"Sony jumped into the games business, disrupted it and succeeded in much the same way that Apple jumped into the portable music business and took over," says Michael Troughton. "The branding was cool, the device was powerful, the technology was good, the business model was better and the timing was right. All of these things made it successful." ✱

Nintendo 64

» **MANUFACTURER:** Nintendo » **YEAR:** 1996
» **COST:** £249.99 (launch), £30+ (today)

When home consoles were ready for the leap to 3D gaming, the engineers at Silicon Graphics felt that they had the right technology to make it work. The company approached Sega with a console design, but the company's Japanese engineers were not convinced by the product and opted for their own design, resulting in the complex and over-engineered Saturn. SGI found a much more receptive partner in Sega's arch rival Nintendo – however, Nintendo would not make it to market until the middle of 1996, giving Sega and more importantly Sony a large head start in the market.

The raw power of the N64, in combination with the development talent Nintendo had access to, ensured that the machine played host to plenty of all-time classics, including *Super Mario 64*, and the unusual inclusion of four control ports enabled multiplayer classics including *GoldenEye 007* and *Mario Kart 64*. However, the decision to stick with cartridges instead of moving to CDs angered some publishers and kept game prices high for consumers, with some third-party games costing up to £70. Ultimately, the system didn't do as well for Nintendo as its predecessor and was heavily outsold by the PlayStation, but retains plenty of fans.

Nintendo 64 Fact

■ The N64 is the only Nintendo console to have fallen to third place within its generation in the Japanese market, having been outsold by both the PlayStation and Saturn in that region.

PROCESSOR: 64-BIT NEC VR4300 (MIPS R4300I-BASED) CPU (93.75MHZ)
RAM: 4MB MAIN MEMORY (EXPANDABLE TO 8MB)
GRAPHICS: REALITY COPROCESSOR CUSTOM GPU (62.5MHZ)
AUDIO: 16-24X SOFTWARE DRIVEN 16-BIT PCM CHANNELS
MEDIA: ROM CARTRIDGE (UP TO 64MB)

EDITOR'S CHOICE Super Mario 64

The N64 feels like it was made specifically to play *Super Mario 64*, and the game alone could justify ownership of the console. The 3D worlds were revolutionary in the mid-Nineties, and remain engaging to explore even if they don't feel quite so expansive today. The quest to collect all 120 stars is always fun, but for us much of the joy of the game comes from simply controlling Mario. The way he leaps and slides around each area is simply perfect motion design – even today, we find ourselves perfectly capable of wasting time by just aimlessly jumping about in the castle grounds.

ESSENTIAL GAME

Point Blank 2

While holding a gun might automatically put you in mind of military themes, we'd argue that the G-Con 45 game you must own is this collection of shooting mini-games. Despite its family-friendly comedic tone, the game is an extremely diverse test of your shooting skills. Whether you're trying to take out a moving target with a single shot, attempting to destroy a huge target with rapid fire or even playing a gun-assisted game of spot the difference, you'll have a whale of a time – and it's even better when played as a party game, thanks to the two-player support.

G-Con 45 Fact

■ Despite the availability of the upgraded G-Con 2, some PS2 developers indulged in some consumer-friendly behaviour by supporting the original G-Con 45 in their games. Compatible games include *Endgame*, *Time Crisis II* and *Vampire Night*.

G-Con 45

» **PLATFORM:** PLAYSTATION » **RELEASED:** 1997 » **COST:** £7 (UNBOXED) / £10 (BOXED)

When *Time Crisis* made its way to the PlayStation, Namco decided that a gun was needed to support it – and boldly, it also decided that the existing model introduced by Konami just didn't meet its requirements. The result was the creation of a new peripheral, the G-Con 45 (or GunCon, outside of Europe) which had a few new features over the old standard. For enhanced accuracy, the gun hooked into the composite video signal of the console itself, and two buttons mounted either side of the barrel allowed players to perform secondary actions, such as hiding in *Time Crisis*.

Of course, the G-Con 45 wasn't without its flaws. It wasn't backwards compatible with existing gun games such as *Die Hard Trilogy*, and players who used RF or RGB SCART to hook up their consoles often got home to find that they needed an extra adaptor to use the peripheral at all. However, it received a good amount of support, as the existing Konami standard was dropped and all new guns adopted the Namco technology. For that reason it remains an essential PlayStation peripheral , so long as you have the CRT TV necessary to run it. ✱

EDITOR'S CHOICE

SoulCalibur

The sequel to *Soul Blade* had been an excellent arcade fighting game, but it wasn't arcade perfect on the Dreamcast – it was *better.* The astonishing visuals really showed off what the console could do, and that was just the start of its charms. The game featured a wide variety of unlockable characters, stages and costumes earned through the Missions Mode, and Cervantes De Leon returned from the first game. It was one of the few Dreamcast games to sell a million copies, and quite rightly, too – if you like 3D fighting games, *SoulCalibur* is an essential addition to your collection.

Dreamcast Fact

■ Despite the Dreamcast's discontinuation in 2001, software support lasted much longer – Sega's last release arrived in 2004, the last official third-party release was in 2007 and unofficial releases continue today.

RAM: 16MB MAIN, 8MB VIDEO, 2MB AUDIO
PROCESSOR: HITACHI SH4 (200 MHZ)
GRAPHICS: NEC POWER VR 2 (3 MILLION POLYGONS PER SECOND)
AUDIO: 32-BIT YAMAHA AICA (64 CHANNEL ADPCM/MIDI)
OPERATING SYSTEM: 2MB DREAMCAST BIOS ROM / MICROSOFT WINDOWS CE
GRAPHICS: GD-ROM (1GB CAPACITY, 12X SPEED)

Dreamcast

» **MANUFACTURER:** Sega » **YEAR:** 1998 » **COST:** £199 (launch), £20+ (today)

If your back's up against the wall you need to pull off something spectacular, and in hardware terms, Sega pulled that off with its successor to the Saturn. The Dreamcast was everything its failed predecessor hadn't been – the sleek white box was aesthetically pleasing, the internal hardware was both powerful and easy to develop for, and the price was attractive. For PAL gamers, the capability to output a 60Hz signal brought an end to years of second-rate releases. Multiplayer fans were well catered for, too, with four controller ports and a built-in modem for online gaming (so long as you were willing to pay the phone bill for dial-up access). Thanks to its past woes, Sega didn't have the financial ability to drop the console's price when it desperately needed to. This was compounded by a lack of third-party support, the impending launch of the PlayStation 2 and the discovery of an exploit which allowed easy piracy without a mod chip. Dreamcast production ended in March 2001, and Sega left the console hardware market. Machines are relatively easy to find today, though certain faults are pretty common including random resets caused by power supply problems, and controller port malfunctions due to faulty resistors.

Dance Mat

» **PLATFORM:** PLAYSTATION » **RELEASED:** 2000
» **COST:** £39.99 (LAUNCH, PACKAGED WITH JUNGLE BOOK: GROOVE PARTY), £5+ (TODAY)

Konami's introduction of the *Dancing Stage* series into European arcades in the late Nineties proved to be a surprise hit, and unsurprisingly the home market was quick to respond. The kid-friendly music game *Jungle Book: Groove Party* hit shelves bundled with this officially licensed dance mat controller in November 2000, over six months before Konami could even get a PlayStation version of *Dancing Stage Euromix* to market. While that's a late debut for an original PlayStation product, the peripheral was given decent support – releases for the PlayStation continued until 2004's *Dancing Stage Fusion*, and the dance mat controllers were also compatible with the PlayStation 2.

Unfortunately, these pads were not durable, and the third-party alternatives fared little better. You'd be quite lucky to get more than a few months of regular play out of them before they broke, particularly if they were regularly folded up for storage purposes. Still, the genre caught on thanks to its universal appeal and party-friendly nature, and the controllers sold by the bucketload. The fad died down by the mid-Noughties, but the success of dance mats proved the market for peripheral-based music games – if you need any proof, just look at your dusty old *Guitar Hero* gear! *

ESSENTIAL GAME
Dancing Stage Party Edition

Dancing Stage Euromix probably has the most nostalgic appeal, but this 2002 release has a bigger song list (a whopping 51 tracks!) and we'd argue that it's better. The game includes remixes such as *Afronova Primeval*, new Konami tracks such as *Drop Out* and *Holic*, and five licensed tracks including *Bad Touch* by The Bloodhound Gang and The Cardigans' *My Favourite Game*. Additionally, quite a few of the tracks are returning fan favourites from *Euromix*, such as *Dead End*, *Dynamite Rave* and *Paranoia*. There's also a bit more lasting appeal, thanks to the fact that you unlock songs as you play.

Dance Mat Fact

■ While most PlayStation dance mats offer four directional buttons for compatibility with Konami's *Dancing Stage* series, the *Dance:UK* series uses a special pad which instead has eight directional buttons.

PlayStation 2

» **MANUFACTURER:** Sony » **YEAR:** 2000
» **COST:** £300 (launch), £15+ (today)

The PlayStation 2's launch was accompanied by an unprecedented wave of hype, and it would ultimately go on to become the best-selling console ever. Though great games were slow to arrive, in part due to the difficulty of working with its complex custom Emotion Engine CPU and Graphics Synthesizer GPU, the console's overwhelming commercial dominance ensured that it gained an enormous and diverse library with many high quality games.

The black, boxy design of the hardware was considered to be something of an Eighties throwback, but it was unique and forward-thinking in that it was designed to stand vertically or horizontally – even the logo on the motorised disc tray could be rotated to match. Disappointingly, the system offered only two control ports at a time when its competitors had four, however it also included two USB ports for peripherals and a FireWire port for linked play, as well as a PCMCIA expansion slot for a hard disk and network adapter. DVD movie playback was also a standout feature, bolstering the system's popularity. The hardware was produced in a variety of colours and underwent a number of revisions over the years, replacing the PCMCIA slot with an expansion bay, losing the FireWire port and gaining an infrared receiver for remote controls. ✱

Playstation 2 Fact

■ In design terms, the PlayStation 2 owes a debt to the unreleased Atari Microbox, a computer that could stand vertically or horizontally and looked like two conjoined boxes. Atari's design is actually referenced in Sony's patent applications for the PS2.

PROCESSOR: MIPS III R5900-BASED 64-BIT EMOTION ENGINE CPU (295MHZ)

RAM: 32MB MAIN MEMORY, 4MB VIDEO MEMORY, 2MB AUDIO MEMORY, 2MB I/O MEMORY

GRAPHICS: GRAPHICS SYNTHESIZER (147.5MHZ), 16 MILLION POLYGONS PER SECOND (WITH Z BUFFER, ALPHA, TEXTURE MAPPING AND FOG)

AUDIO: 2X SPU, 48 CHANNEL ADPCM PLUS SOFTWARE-MIXED DEFINABLE, PROGRAMMABLE CHANNELS

MEDIA: CD-ROM (UP TO 650MB), DVD-ROM (UP TO 8.5GB)

EDITOR'S CHOICE Ridge Racer V

Namco's arcade racer came in for some harsh criticism back in 2000, largely because it failed to revolutionise the *Ridge Racer* formula. With the benefit of hindsight, it's easy to see that major changes would have been an attempt to fix something that wasn't broken – the handling is satisfying and the track design is excellent. It's also an attractive early game for the system (though the lack of anti-aliasing leaves it with a jagged look), and the hard-edged electronic soundtrack fits the game's aesthetic well. Just avoid the PAL version if you can, since there's no 60Hz option.

EDITOR'S CHOICE
Advance Wars 2: Black Hole Rising

Turn-based strategy might not seem like the best fit for a handheld console, but Intelligent Systems' intuitive take on the genre is perfectly suited for gaming on the go – each action is quick and it's possible to save at any point. To be honest, though, this isn't a game to take on the bus – it's the kind you take to bed to finish a mission, only to realise that you're still up at three o'clock in the morning and work tomorrow is going to suck. Both *Advance Wars* games are great, but we slightly prefer the expanded and refined sequel.

Game Boy Advance Fact

■ To compensate for the console's dark screen, many SNES conversions had their colour palettes lightened for GBA, including *Super Mario World* and *Donkey Kong Country*.

PROCESSOR: ARM7 32-BIT CPU (16.8 MHZ)
RAM: 256KB MAIN MEMORY, 96+32KB GRAPHICS MEMORY
GRAPHICS: 240X160 DISPLAY, UP TO 512 COLOURS (FROM 32,768 PALETTE) 128 SPRITES PER FRAME, HARDWARE SCALING AND ROTATION EFFECTS
AUDIO: 2X 8-BIT DAC, 2X SQUARE WAVE CHANNELS, 1X WAVE CHANNEL, 1X NOISE CHANNEL
MEDIA: ROM CARTRIDGE (UP TO 256 MEGABIT)
POWER: 2X AA BATTERIES (15-HOUR LIFESPAN)

Game Boy Advance

» **MANUFACTURER:** Nintendo » **YEAR:** 2001 » **COST:** £89.99 (launch), £12+ (today)

When Nintendo dropped the Game Boy Advance into the hands of gamers around the world, it wasn't a moment too soon. Players had long been yearning for a more powerful portable, and though rumours of a 32-bit, full-colour Nintendo handheld had been swirling about the games press since the mid-Nineties – 1998's Game Boy Color was a minor upgrade that clung to old 8-bit tech. The Game Boy Advance finally delivered on the old rumours, serving as a 2D powerhouse with SNES-style graphics (and indeed, quite a few SNES conversions) as well as offering rudimentary 3D capabilities. It was backwards compatible with the old software, too.

The GBA was also a design revolution for the Game Boy brand. The old vertical orientation was discarded in favour of a more comfortable setup, with the D-pad and buttons either side of the screen, and new shoulder buttons were added. Up to four players could participate in link-up games using a single cartridge. The new widescreen display was the machine's only real fault – the non-lit screen was far too dark without an external light source, leading to many aftermarket backlight mods and eventually the revised Game Boy Advance SP model. ✱

INSIDE THE XBOX

MICROSOFT MAESTROS

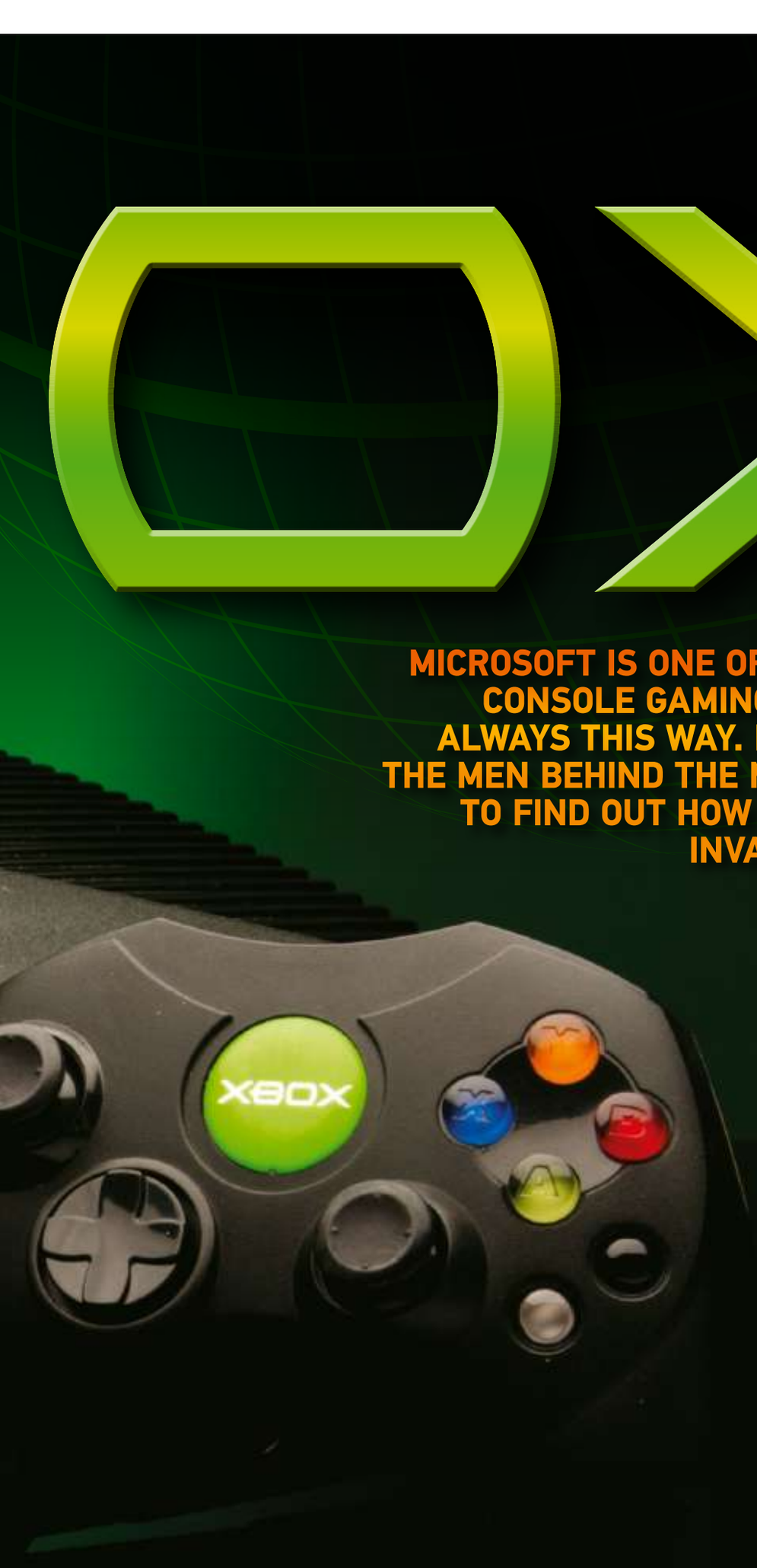
The developers who dared to think outside the box

SEAMUS BLACKLEY
Xbox CTO

ED FRIES
VP of Games Publishing, Microsoft Game Studios

OX

MICROSOFT IS ONE OF THE TITANS OF TODAY'S CONSOLE GAMING WORLD, BUT IT WASN'T ALWAYS THIS WAY. NICK THORPE SPEAKS TO THE MEN BEHIND THE MACHINE AND ITS GAMES TO FIND OUT HOW THE WINDOWS COMPANY INVADED THE LIVING ROOM...



The idea of Microsoft making a games console in 1999 was fucking ludicrous!" Seamus Blackley's recollection isn't wrong, but such a notion seems like ancient history today. Microsoft is now established in the console gaming industry, with a tenure that is soon to match the likes of Sega and Atari's hardware ventures, so it's easy to forget a time when journalists openly questioned how such a "terminally uncool" company could make a successful incursion into an entertainment business. But the Xbox did succeed thanks to a band of committed gamers, a forward-thinking approach to development and a boatload of cash – and there's never been a better time to get into the console than today, thanks to its cheap games.

The Xbox story begins with Seamus Blackley, who in the late Nineties was at Microsoft and in charge of entertainment graphics on Windows – essentially, getting multimedia and gaming applications working nicely. "Sony announces the PlayStation 2, and they say it's going to replace the PC," recalls the industry veteran. "I had the roadmaps of all the graphics card manufacturers – 3DFX, Nvidia, ATI. I was visiting my girlfriend who was at that point living in Boston, flying there, and I realised that the roadmap for graphics from the guys making cards for the PC was going to far exceed the performance of what PlayStation ▶

was going to do." The only problem for Seamus was the PC platform itself. "I'd been making PC games at that point for many years. You have to pander to the lowest common denominator, so you can never make a game that actually uses the full performance of any of these things, whereas on console you can because obviously you've got a single hardware target."

The appeal of a single platform was somewhat rooted in Seamus' recent development history. "I had nothing to lose but I was also passionate, because I had this titanic and horrible failure with the game *Trespasser*," notes Seamus. The *Jurassic Park* tie-in was ambitious – its environments, physics engine and rendering techniques were far beyond what most games had to offer in 1998, but it was shoved out of the door early and required a monstrously powerful PC to run acceptably. Together with fellow DirectX engineers Kevin Bachus, Ted Hase and Otto Berkes, Seamus drew up a plan for a "DirectX Box" console. "Our entire goal was to make a box for developers, because we were all developers," Seamus explains.

» Instead of porting PC properties, existing Microsoft developers like FASA Studio worked on new games, like *Crimson Skies*.

> **"When it was looking bad, people called it 'Coffin Box' – Your career's in the coffin if you work on that!"**
> Seamus Blackley

Rather than using the custom components of its competitors, the team chose to employ largely off-the-shelf PC parts in the hardware design. "At that time, everybody made games on the PC. All the PlayStation games – even Nintendo, the PC was the development platform. They would have a target, and then they would compile it for this other platform, because the PC had all the tools," explains Seamus, explaining the philosophy behind this choice. "So the basic, simple thought is why don't we just have the target platform also employ that architecture? Then it's super trivial and nothing gets in your way. If we can do that, then we should have a huge advantage in making better content, and in a content business that's the win."

To get that content, the DirectX team would have to work with Microsoft's established gaming division. "I'm someone who loves games, and I had left the Office side of the company to run Microsoft's game business because of that," remembers Ed Fries, former vice president of game publishing at Microsoft. "I had worked for about four years to grow Microsoft's game business on the PC and we had done well there, so we were just starting to think about how we could grow more and faster. That involved thinking about getting into the console world, where we hadn't really done anything yet. So that was what was in my head when the guys from the DirectX team first walked into my office and proposed the original Xbox." Ed would soon find himself as part of that team, managing Microsoft's internal Xbox software development efforts, and after launch he became responsible for third-party relations, too.

Selling the Xbox vision was easier said than done, in part because the Xbox as a consumer entertainment device didn't fit the company culture of selling business software. "One of the huge problems we had was that we were at the Windows company," Seamus explains. "We said, 'Hey, we want to make this games console,' and every Microsoft guy who had been steeped in operating systems said, 'Oh yes, Windows for the living room – it'll run Windows and we can upgrade it,' and we would freak out and say, 'No, it's fixed, that's not how this business works.' We had to explain to them that the console business was a business in which you sold content, and made money from the content, not from the operating system." Seamus and the Xbox team would have to fight an uphill battle against corporate caution, and soon learned that the best way to fight it was to make out that there was no battle at all. "There were a lot of people who said it should be Windows for the living room, and we surfed on that – we let people believe that because it helped us. Members of our tiny little rogue tribe, we understood that the end result was going to have to be no operating system."

While an internal political battle is no surprise, what comes as a shock is that despite being aware of the company's power and resources, the games industry was also sceptical of Microsoft's chances

» Seamus Blackley credits Bill Gates, seen here unveiling the Xbox, as being a key internal supporter of the console.

» *Halo 2* generated an enormous $125 million in sales on launch day.

in the console market. "For the first six months, Xbox was me and Kevin going around and giving a presentation for developers," recalls Seamus. "We had a meeting with the president of one of the big Japanese game companies. He proceeded to tell me that Xbox was going to fail, that no American console could succeed, and that I was going to be unable to get Microsoft to do it, and that nobody was going to believe that Microsoft would carry through." That wasn't the only hostile response Seamus endured, as another incident at a large publisher's Canadian studio illustrates. "The guys who ran that office took me aside and told me I couldn't speak there because they didn't believe Microsoft would do a console, and that I could pull it off. The whole audience was waiting for 40 minutes while they grilled me."

Right up until the green light was given, other people wanted to have their say, and the Xbox team found itself fending off attempts to turn the project into Web TV, a tablet and other such things that were closer to Microsoft's comfort zone – as well as attempts to kill it stone dead. "When it was looking bad, people called it 'Coffin Box'," remembers Seamus. "Your career's in the coffin if you work on that! People would say this to me and I'd say 'No, it's going to succeed' and then I'd drive home crying."

What ultimately kept the project from failing was the support of the company's old guard, from the early Windows days. "A few people who were around from that era, and remembered what it was like, were reminded of it by what we were ▶

» Rare utilised the power of Xbox to make Conker look fluffier than ever before.

Q&A: PHILIP OLIVER & ANDREW OLIVER

The men in charge of Blitz Games look back at the creation of the first published Xbox game

» Designed as the Xbox's answer to party games like *Mario Party*, *Fuzion Frenzy* sold enough to warrant a sequel.

How did you get the job of producing *Fuzion Frenzy* for Microsoft?

Philip: When Microsoft decided to enter the console market they sensibly decided to contact many major developers around the world. Blitz Games was growing fast and gaining a great reputation for mass market, fun character-based games. They wanted to launch with a variety of first-party games that appealed to different player types and one of the slots they were trying to fill was a party game. This fitted our profile well and we were invited to pitch.

What were the advantages and disadvantages of the Xbox hardware compared to the competition?

Andrew: It really was a standardised PC in box. This meant it was extremely familiar and easy to develop for, especially for any developers that came from PC development. In fact, Microsoft told developers to just get on and write the games, ASAP, with high spec PCs and console-style controllers.

How long did development of *Fuzion Frenzy* take?

Philip: We learnt Microsoft was planning a console in summer 2000 and pitched Blitz Party in the Autumn. November and December saw us getting the team together and getting the project underway. To win the contract, not only did it need to be a great compelling game, we had to agree to have the game mastered by the end of August 2001. Microsoft assured us things would move fast from their side and so we immediately put developers on making minigames, as we only had ten months of development time.

How did you come up with the minigames found in *Fuzion Frenzy*?

Andrew: We had a team of about 35 people on the game and split them into three subteams. Within these subteams we paired artists with programmers and each had to create a prototype game a week for the first two months. Then, working with our Microsoft Producer, Gordon Hee, we picked the ones that were working best and dropped those that looked problematic or just weren't fun. The next phase was to work up the chosen prototypes to more polished games, with depth, AI and fitting the chosen art style. It was massive parallel development and it worked really well and resulted in 45 minigames and the metagame. *Fuzion Frenzy* was completed on schedule and was the first mastered game for Xbox, in fact it appeared on shop shelves a week ahead of the Xbox itself!

» As of the 7 November 2018 launch of the Xbox One X, *Fuzion Frenzy* is now backwards compatible on the Xbox One.

What audience was the setting and cast of *Fuzion Frenzy* designed to appeal to?

Philip: We wanted to ensure there was a consistent style running through all the games, even though they were all very different in gameplay. So, whilst designers and programmers were prototyping fun minigames, the art team were working on characters and art styles that would bind everything together coherently. They took inspiration from the skaters and boarders scene and then we decided to give it a strong futuristic sport arena look, taking inspiration from films like *Blade Runner* and *The Running Man*. We worked with JD Alley, the Microsoft Art Consultant to finalise the style.

How did you feel about *Fuzion Frenzy*'s sales and critical reception?

Andrew: I think the reception and sales, around half a million copies for the opening selling quarter, were all pretty reasonable and justified. Obviously, we'd hoped for more, but the small install base, and cost of additional controllers limited its potential. The development team continued development with *Fuzion Frenzy 2* with online play, as we knew that in the new year Microsoft would be launching the Live service and *Fuzion Frenzy* would make an obvious launch title for the service. Sadly, slow sales on the original boxed version meant they halted development of this version.

Later, sales continued to rise and over a million copies were sold. We were in constant contact with our producer and we convinced them it was worth making a sequel. However, due to internal politics at Microsoft, whilst they agreed to a sequel, they put the game out to tender and we had to bid competitively to win the rights to develop it. Hudson Soft was chosen as the developer of the sequel and they used a lot of our concepts.

We are extremely proud of *Fuzion Frenzy* and the team that built it. Those ten months were a pretty intensive time for all involved, but it was fun to develop and we so pleased that so many people found it fun to play and still fondly remember it.

BARGAIN HUNT

IF YOU WANT TO GET YOUR XBOX COLLECTION OFF TO A FLYING START, CHECK THESE OUT...

AMPED..... £0.50

■ This is an enjoyable snowboarding game, featuring free-roaming action that wouldn't become commonplace until later in the decade.

CHRONICLES OF RIDDICK: ESCAPE FROM BUTCHER BAY..... £1.00

■ This first-person adventure is a fantastic prison break tale, which allows you to both attack from the shadows and enjoy brutal brawls.

DEAD OR ALIVE 3..... £0.50

■ This fast-paced fighting game boasts phenomenal graphics and multi-tiered arenas to smash your opponents through.

FABLE: THE LOST CHAPTERS..... £0.50

■ This Classics version of the ambitious Lionhead RPG has even more content than the original, with extra areas, quests and more.

HALO: COMBAT EVOLVED.. £0.50

■ The FPS which almost single-handedly propelled the Xbox to success is an essential purchase for this crazy price.

HALO 2..... £0.50

■ It's the bestselling Xbox game ever! For this price, you might as well buy four copies and get a good old fashioned LAN party going.

NINJA GAIDEN..... £1.00

■ It's tough, but this 3D revival of Tecmo's classic franchise is a fast, stylish and very violent hack-and-slash adventure. Heads *will* roll.

PROJECT GOTHAM RACING 2..... £0.50

■ Bizarre Creations' sequel occupies the middle ground between arcade excitement and hardcore simulation.

TOM CLANCY'S SPLINTER CELL £0.50

■ This stealth classic is at its best on Microsoft's console, thanks to longer levels and a tougher challenge all-round.

TOP SPIN TENNIS..... £0.50

■ This doesn't let you give Tim Henman the Wimbledon victory he craved, but that's about all this excellent tennis game doesn't do.

TOTAL..... £6.00

» *Knights Of The Old Republic* was a big exclusive draw for *Star Wars* fans and RPG fans alike.

▶ doing with Xbox and helped us out," Seamus recalls. "Chief amongst them was Bill Gates, but also Rick Rashid who ran Microsoft Research and Rick Thompson who ran the hardware group, and many, many others who loved the spirit of the thing, and backed us up politically in ways that I didn't even understand that we needed."

After getting the green light, Ed had less than two years to put together a launch line-up. As well as commissioning games from respected external studios, Microsoft employed what Ed calls an "all hands on deck" approach to game development internally. The teams that had been responsible for the company's successes in PC gaming were involved, but for various reasons didn't bring the old properties across. "It didn't really make sense to take *Flight Simulator* over, but it was certainly considered at times," Ed recalls. "The guys at Ensemble Studios looked at *Age Of Empires* and had multiple Xbox prototypes that they were developing, but none of those ended up turning into something real. The FASA group had a lot of contributions, *Crimson Skies* is a well-loved original Xbox game, and that came out of a PC game that the group had developed a few years earlier." While not a conscious choice, this ultimately gave the Xbox an identity distinct from Microsoft's PC gaming heritage.

For all of the gaming expertise that already existed within Microsoft, the team that would ultimately make the biggest impact was a new acquisition, Bungie. The team had a good reputation from the *Marathon* and *Myth* games,

» *Ninja Gaiden* put the Xbox to great use, displaying a number of impressive graphical effects.

> **"As far as Bungie goes, I definitely bet everything on Halo… All I was going to get was the team and Halo"**
> Ed Fries

but had hit financial trouble and was up for sale. "As far as Bungie goes, I definitely bet everything on *Halo*," says Ed. "I had to do a deal with [minority Bungie owners] Take-Two, and basically the way we put the deal together was they got the back catalogue, all the old work and brands from the past, and all I was going to get was the team and *Halo*." The promising first-person shooter had already been revealed for PC and Mac, but Microsoft decided it'd be a great Xbox exclusive.

Did I know then that *Halo* would be the killer app? In a lot of ways, we didn't really know what we were doing," confesses Ed. "We had never done a game in the console world before. We were getting a lot of mixed feedback – a lot of people looked at *Halo* and thought it looked like a PC game, they thought it wasn't colourful enough, the characters weren't cartoony enough. There was a nagging feeling that because we had come from a PC heritage, that this was the game that appealed to us, but it wouldn't to the regular console audience." Knowing that the office favourite might not be universally appealing, the team made sure to back a safer bet too. "At the same time we were working with Lorne Lanning, who is a super talented guy with his *Oddworld* franchise which had been proven successful on the PlayStation," Ed explains. "That was another game we were excited about, so we launched both games with a pretty similar amount of marketing support."

What helped every team was that the system was easy to work with. This was the biggest goal for the system, and by all accounts the team delivered on this front. Chris Sutherland was at Rare as the company transitioned from GameCube to Xbox, and remembers the move being relatively painless. "As you'd expect with Microsoft, there was plenty of documentation so it wasn't too tough to move over," the programmer recalls. Former Bizarre Creations developer Stephen Cakebread was also impressed with the developer support, particularly when it came to tools. "They were a significant step up from the tools on other platforms, and eventually they even surpassed what was available on the PC," he explains. "Even though the Xbox had better raw performance numbers over the competition, I think the improved environment for devs is what made the most difference." It was a big win for the team, and one which Seamus considers to be a signature achievement for the platform. "Sony and Nintendo got away with treating their developers terribly," he says of the pre-Xbox years. "The thing that I'm most proud of, that I think everybody can be most proud of, was that Sony suddenly had to do developer support."

It also didn't hurt that as a piece of hardware, the Xbox was a beast. The system packed a 733MHz Intel Pentium III CPU, a custom Nvidia GeForce 3-based GPU, 64MB shared RAM and a DVD drive. The machine also included an 8GB hard disk – a first in console gaming. This was a big advantage, as former Bizarre Creations programmer Stephen Cakebread explains: "The HDD was faster than a DVD, so if you copied files from the DVD to the HDD you could load them much faster next time around, with the additional bonus that you could load from both the HDD and DVD at the same time! (eg, loading levels from one and streaming music from the other)." Overall, the Xbox had the specification of a decent PC of the time (which still would have cost twice as much as an Xbox on launch), but as the Xbox wasn't burdened with the task of running Windows and its developers didn't have to worry about supporting lesser systems, its gaming performance was astonishing.

When the press finally got their hands on the Xbox, reception was broadly positive though there were some reservations about the console's look, as well as the enormous joypad nicknamed the 'Duke' by players. "You should ignore ▶

» Richard Branson sells the UK's first Xbox at the Virgin Megastore on Oxford Street.

Q&A: MARTYN CHUDLEY

The man in charge of the Project Gotham Racing series remembers the start of the series

What did the Xbox offer over the competition in terms of performance? What was it like to code on?

The Xbox was a dream to develop for. The PS2 was crazy powerful for the time, but you had to work so hard to get access to that power – with the Xbox, it was all abstracted, allowing our coders to get far more of the raw power with much less effort. We also had a stable development environment through Microsoft's pre-existing Windows development tools. We (Bizarre) also had direct access to the Microsoft guys and gals who were 100 per cent responsible for the hardware and software, so this support was amazing.

How did your exclusivity deal on *Project Gotham Racing* come about?

The deal for *PGR* came about as a result of Sarah (my other half) and Brian (Woodhouse – our Development Director) doing a pitch to Microsoft for an 'F1-style game in cities', as way of a follow up to *Metropolis Street Racer*. We 'knew' at that point that Dreamcast was effectively dead and that Sega would be going to become a multiplatform publisher, but they refused to acknowledge this to us. Ideally, we would have taken *MSR* to both PS2 and Xbox with Sega, but they just couldn't admit their situation to us in time for us to recoup some of our losses. Upon doing the 'F1-ish' pitch, the chaps at Microsoft saw a near-complete demo version of *MSR* and simply said, 'Why not give us *that*?'

Upon examining our contract with Sega it transpired that we (Bizarre) owned all the code and data, whereas Sega just owned the IP – essentially just the name *Metropolis Street Racer*. This meant that we could do a 'homage' game, using all of the cities and any new cars that Microsoft would license, just as long as we didn't call it *Metropolis Street Racer*!

Was there much stress getting the game ready for launch?

Oh yeah – it was mega stressful for the entire production. We basically had well under 12 months from start to finish. Our original plans for development started at the tail end of 2000, targeting console release of November 2001. This was a stupidly tight schedule given that we were doing a complete code rewrite, remodel of all the cars, had to hire new staff, working with a brand-new set of production people and to cap it all had multiple revisions of (usually underpowered) preproduction hardware and libraries to aim at.

» We're hoping that *PGR* will be announced as a supported title on the Xbox One's backward compatibility list.

» *Project Gotham Racing* was warmly received on its debut, netting 8/10 scores from *Edge*, *Game Informer* and Eurogamer.

How did you end up choosing the four city locations you went with?

The original locations (San Francisco, London and Tokyo) were chosen in conjunction with Sega as they were absolutely iconic, fit the key console territories and were all visually (and layout-wise) unique. New York was, again, chosen for its worldwide recognisability and also it was relatively easy for us to perform the research trips. In fact the cover art of the game was to feature the Ferrari F50 in front of the Twin Towers, but due to the catastrophic events of 9/11 we had long discussions with Microsoft about whether to keep (as a tribute) or remove the towers from the game (which we eventually did).

What improvements did *Project Gotham Racing* make over *Metropolis Street Racer*?

As far as I can remember, the biggest improvements over *MSR* included the addition of New York, and higher 'perceived value' cars – Ferrarri, TVR etc. Ultimately, the game was a complete rewrite from the Dreamcast code – everything, not just the engine. Physics, gameplay, UI, you name it. From a technical perspective Xbox gave us an order of magnitude more polygons (in the cars at least, the cities were just upscaled where it made most sense given our time pressures), shader effects (mainly reflections in both car rendering and circuit, and improved weather) and a doubling of the framerate to 60fps. I think we also made a conscious effort to make the game more 'mainstream' than what we perceived as a pretty hardcore *MSR* experience.

Why do you think Microsoft have never created a fifth game?

I'm guessing that basically Microsoft felt they could cover all bases with both the *Forza* and *Forza Horizon* brands – they didn't need a *PGR* hanging around in between, not quite a simulator, not quite an arcade experience. I think that if we had stayed with Microsoft (and not been acquired by Activision) then a *PGR5* could have happened, but alas it was not to be…

Finally, on a personal note I'd like to add that *PGR* couldn't have happened without our coder Edmund Clay, who sadly passed away in 2013. Edmund joined us to work on *PGR*, and I don't think there was an area of the game that he didn't touch – physics, rendering, AI, shaders - you name it, he was a massive influence.

"I think the improved environment for developers is what made the most difference"

Seamus Blackley

▶ the naysayers and doom merchants who have ignorantly dismissed Xbox out-of-hand," opined *Edge* after taking delivery of the finished product. "It's expensive, corpulent and the joypads aren't entirely ergonomic – but by the gods is it powerful." What's more, the software accompanying the machine delivered. In particular, *Halo* was hailed as "the most important launch game for any console, ever" by *Edge* and received the magazine's fourth 10/10 score. Other reviewers were similarly impressed, as evidenced by its score of 97 on review aggregator Metacritic.

The first territory to receive the system was North America, on 15 November 2001. Propelled by the popularity of Bungie's *Halo* and demand generated as a natural result of the holiday season, the Xbox sold an impressive 1.5 million units in the region before the end of the year. It was an encouraging start for a system that had faced so much scepticism, and North America would remain the console's stronghold for the duration of its lifetime – for every Xbox sold in the rest of the world, Microsoft sold two on its home continent.

However, things weren't nearly so rosy in Japan. Microsoft brought 250,000 consoles into the country for launch, and attracted some very high profile Japanese developers. Tecmo jumped in with both feet and provided some great exclusive

» People still love this alluring Xbox prototype – possibly because the production machine is no looker.

games, and Sega did the same while also building its Chihiro arcade platform around the console. However, others were more cautious. The likes of Capcom, Namco and Konami all jumped aboard, but didn't necessarily bring their big hitters with them – *Resident Evil* and *Tekken* didn't appear at all, for example. Companies like Square, Enix and Atlus stayed away completely. The Xbox never shed the perception that it was a product built by a foreign company for foreign audiences, and never gained a foothold in Japan as a result, selling a miserable 450,000 consoles over its entire lifetime.

Trading also proved difficult in Europe. The Xbox launched to great fanfare on 11 March 2002, but sales quickly dropped off and after just five weeks Microsoft announced that it would slash the price of the console by a third, cutting it from £299 to match the PlayStation 2's £199 price tag. The move understandably upset early adopters, who were offered two free games and an extra controller to make up for the unprecedented price drop, but it did serve to stabilise the system – during the week of the cut, Xbox sales were neck and neck with PS2 sales. The move also sparked a price war. Nintendo cut its GameCube price before even launching, and two subsequent price cuts brought the Xbox down to just £129 by April 2003. Cutting the price of the console by over 50 per cent in a little over a year did eventually convince European consumers to pick up the machine, but also ensured that Microsoft took heavy losses on every piece of hardware sold.

» The ease of porting from PC to Xbox ensured that the machine received versions of high-profile games, like *Doom 3*.

» Great Japanese games like *Panzer Dragoon Orta* failed to sell the Xbox to the Japanese public.

Microsoft also took other measures to ensure the success of the Xbox. A major one was the purchase of Rare, long considered to be one of Nintendo's key studios – a shock to players at the time, but something that had been brewing behind the scenes for some time. "I was equally shocked when they approached me and there was an opportunity to work with them," Ed reveals, surprisingly. "They had an interesting deal with Nintendo. Nintendo owned 50 per cent of Rare, and when they put that deal together, it was done well. They didn't want to sell half of their company and never be able to sell the other half. So they had a deal where [Nintendo] buys half, and then has the option to buy the other half within a number of years – and if you do not buy the other half, then [Rare] has the right to buy back your half at fair market value." The deal had already expired by 2000, but Nintendo paid for a two year extension and then declined to buy the company when the opportunity came around again.

Microsoft's $375 million purchase of Rare was made public on 24 September 2002, the day after Rare's only GameCube game was released. "I'd known there was a decision to be made between Activision and Microsoft," recalls Chris, who didn't perceive any shift in focus after the deal. "Rare wanted to carry on making the kinds of games it had been making and that would have been the wish of Microsoft too!" Ironically, though, Rare actually produced more games for Nintendo's Game Boy Advance than it did the Xbox during this time – only *Grabbed By The Ghoulies* and *Conker: Live & Reloaded* appeared on Microsoft's console, though it wasn't the only project Rare was working on. "*Kameo* was being built on the original Xbox, but it was brought over with a visual overhaul to the Xbox 360 as a launch title," explains Chris.

» The *XSN Sports* range of games was key in the early years of the Xbox, before EA built Xbox Live support into its own sports games.

In November 2002 Microsoft launched its online gaming service, Xbox Live. The high-end service relied on broadband internet connections and required an annual subscription, but was far in advance of the decentralised online experience on PS2 and the near-total lack of online games on GameCube. Players enjoyed relatively lag-free and stable sessions, had a single username across all games, as well as systems for adding friends, sending messages and even voice chat. In ▶

▶ November 2004, the service was extended to include downloadable game distribution via the new Xbox Live Arcade service, which allowed players to buy small, download-exclusive games such as *Bejeweled* and *Ms Pac-Man* for relatively low prices. As it arrived late in the life of the Xbox, this was a relatively short-lived service that hosted less than 30 games in total.

While players looking for online console gaming were undoubtedly best served by Microsoft, it's worth remembering that those customers were still a relatively small market – Xbox Live picked up a million subscribers by July 2004 and doubled that to 2 million by July 2005, but take-up of the service was never beyond ten per cent of the total Xbox user base at any given time. "I think Xbox Live truly took off with the 360," says Stephen, who points to the technical limitations of the era. "Having a wired internet connection to whatever room you had your gaming system setup in was a big ask for a lot of people, while Wi-Fi is ubiquitous now."

» *Dead Or Alive 3* looked absolutely astonishing in 2001, and holds up well today.

"If I had really known how powerful Sony and Nintendo were, I would have probably given up and there wouldn't be an Xbox"

Seamus Blackley

By 2004, the Xbox had gone from office punchline to legitimate knockout artist. The enormously popular *Grand Theft Auto* games made their way to the platform, as did Konami's *Pro Evolution Soccer*. EA launched its first Xbox Live compatible sports games, and in November, *Halo 2* became the biggest entertainment launch of all time. But despite its successes, the Xbox was not a tremendously long-lived console. On 12 May 2005, just three-and a-half years after the Xbox had initially gone on sale, Microsoft unveiled the next-generation Xbox 360 for release later that year. On the same day, Nvidia announced that Microsoft had ceased orders for the Xbox GPU and wouldn't be taking any more after 1 August – effectively shutting down production of the original console for good. Xbox owners would still enjoy a full slate of games into 2006 thanks to third party publishers, but releases dropped off following that year's holiday season, with just a handful of licensed games and annual sports updates arriving in 2007. The last Xbox game to be released was *Madden NFL 09*, in August 2008, and original Xbox Live shut down on 10 May 2010 (some weeks after its original 15 April termination date, thanks to some dedicated *Halo 2* players).

For all of Microsoft's clout as a company, and its considerable financial expenditure, the Xbox could only manage second place in its generation. "If I had really known how powerful Sony and Nintendo were, I would have probably given up and there wouldn't be an Xbox," admits Seamus. 24 million Xbox consoles were sold, scraping ahead of Nintendo's GameCube by just over 2 million units but falling massively short of the 155 million PlayStation 2 consoles that Sony sold. However, Microsoft gained many positive things from the original Xbox. It successfully established itself as a major player in the console market, building consumer recognition and developer relationships that would pay dividends for the Xbox 360. What's more, the Xbox allowed Microsoft to influence the wider console market, as the console shaped the future development of games consoles on a technical level. Every major console released since the Xbox has included some form of mass storage, built-in broadband internet support and support for downloadable software.

If you missed out on the system first time around, now is a great time to catch up as the Xbox is possibly the best value platform in retro gaming right now. Very few games are anywhere near their original price, and most are ridiculously cheap – even the very best on the platform. Original hardware isn't too hard to come by, and if you're stuck for that the Xbox 360 will run certain games (be sure to check before you buy). Microsoft has also announced plans for original Xbox backwards compatibility on the Xbox One.

Looking back at the impact of the Xbox, Chris feels it comes down to the skills transferred from Microsoft's other business. "This was really Microsoft's first sizeable foray into gaming

» Big new Western gaming franchises, such as *Splinter Cell*, got their big break on Xbox.

» In 2000, Raven and her giant robot buddy danced together to introduce the Xbox to the world.

entertainment; yes, they'd had *Flight Simulator* before and had built joysticks, but creating their own console was in many ways an unexpected move for a company that was more associated with operating systems and business software," he explains. "Their experience with working with developers on those more conventional products would have helped them build a system that would also be easy to develop for by game studios." But that's far from the only factor, as Stephen reminds us. "*Halo* defined the Xbox," the coder states. "There were plenty of other good games, but *Halo* was why you bought one in that first year after launch."

However, the last word must go to Seamus, for whom all of the political battles and the frustrated car journeys home were worthwhile because of the players themselves. "There are all of these times in my life when, wandering around, I meet somebody who tells me that Xbox stopped them from killing themselves during their divorce, or was the only reason they could survive as a kid in some horrible situation, or got them interested in studying science and now they have a PhD in chemistry. Every time that happens I choke up because I see a person in front of me whose life is better, and there's really nothing like that. That's what it's about." And he's right – the Xbox made an impact on the gaming industry and on Microsoft, but the real legacy of the Xbox lies in every *Halo* LAN party, your moral choices in *Fable*, and all those times you stayed up a little *too* late on Xbox Live.

Special thanks to Seamus Blackley, Ed Fries and everyone else who contributed to this article.

» With games like *Project Gotham Racing 2*, the Xbox brought the dream of photorealism closer than ever before.

SPECS BOX

Take a look at how the guts of the Xbox compared to other machines of its era

DREAMCAST

RELEASED: 27 November 1998

CPU: 200MHz Hitachi SH-4

GPU: 100MHz VideoLogic PowerVR2

MEMORY: 16MB RAM, 8MB video RAM, 2MB audio RAM

MEDIA: 1.2GB GD-ROM

STORAGE: Up to two Visual Memory Units per connected controller (128KB each, optional)

NETWORKING: 56k dial-up modem (standard) / Broadband adapter with Ethernet port (optional)

CONTROLLER PORTS: 4

PLAYSTATION 2

RELEASED: 4 March 2000

CPU: 295MHz 'Emotion Engine'

GPU: 147.5MHz 'Graphics Synthesizer'

MEMORY: 32MB RAM, 4MB video RAM, 2MB audio RAM

MEDIA: 8.5GB DVD-ROM

STORAGE: Up to two memory cards (8MB each, optional), 40GB hard disk (optional)

NETWORKING: i.LINK port for local networking (standard on pre-2003 models), Network adapter with dial-up modem and Ethernet port (optional), Ethernet port (standard on slimline models)

CONTROLLER PORTS: 2

GAMECUBE

RELEASED: 14 September 2001

CPU: 485MHz IBM 'Gekko'

GPU: 162MHz ATI 'Flipper'

MEMORY: 24MB RAM, 3MB video RAM, 16MB audio/DVD cache

MEDIA: 1.5GB miniDVD-based 8cm disc

STORAGE: Up to two memory cards (512KB – 8MB each, optional)

NETWORKING: 56k dial-up modem (standard), Broadband adapter with Ethernet port (optional)

CONTROLLER PORTS: 4

XBOX

RELEASED: 15 November 2001

CPU: 733MHz custom Intel Pentium III

GPU: 233MHz Nvidia NV2A

MEMORY: 64MB shared RAM

MEDIA: 8.5GB DVD-ROM

STORAGE: 8GB hard disk (standard), Up to two memory units per connected controller (8MB each, optional)

NETWORKING: Ethernet port (standard)

CONTROLLER PORTS: 4

Steel Battalion Controller Fact

■ There are two versions of Capcom's controller. The original game features green buttons, while the *Line Of Contact* version sports blue ones.

Steel Battalion Controller

» **PLATFORM:** XBOX
» **RELEASED:** 2002
» **COST:** £129.99 (LAUNCH), £150+ (TODAY)

We wonder when the alarm bells started ringing at Capcom's HQ after *Steel Battalion* was pitched? Was it when producer, Atsushi Inaba, explained he wanted to create a "product-focused project", or when his team decided to move development over from the stupidly successful PS2 to the more powerful, but less popular, Xbox? Perhaps it was when he revealed that the controller would be gigantic and would feature around 40 buttons. Oh, and it was to retail for £130? We're not sure when those alarm bells started ringing, but we are glad that Capcom's gargantuan peripheral actually exists.

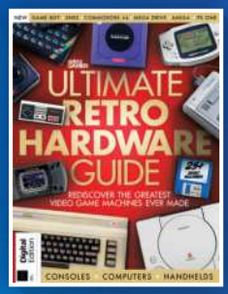
No mech game is as immersive as *Steel Battalion* is (or *Tekki* as it's known in Japan). While it's not going to appeal to all fans of the genre (it's a little too simulation-heavy for our tastes), it's arguably the one that makes you most feel like you're stomping around in a gigantic vertical tank. Simply starting up your VT requires several buttons and switches to be flicked and pressed, and things only get more complicated once you get the damned thing moving. And let's not mention the horror that sets in when you realise you've lost your entire progress because you were unable to reach the eject button in time (cowards play it with the plastic covering flipped up).

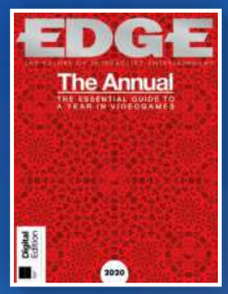
After 15 years of pondering we still can't decide whether the release of *Steel Battalion* is one of the ballsiest, cleverest or stupidest decisions that Capcom has ever made. What we do know is that there's nothing quite like it in the industry, and it's highly likely that there will never be anything like it again. ✱

ESSENTIAL GAME Steel Battalion

Although two *Steel Battalion* games were released in support of the peripheral, the sequel, *Line Of Contact* is virtually unplayable today as it was predominantly online-based. Fortunately, the original is still worth playing and it remains one of the most unique experiences you can have on Microsoft's console. It's far more simulation based than the likes of *MechAssault* and *Metal Wolf Chaos*, so turning at too fast a speed will cause your VT to helplessly topple over. Stick with it, though, and you'll discover a rare gem that offers you what you put into it.

Discover the origins of all your favourite characters

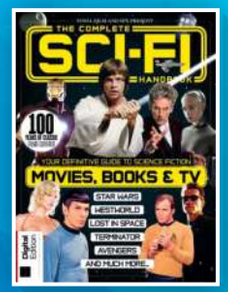




Expert strategy guides full of top tips to improve your gaming

BUFFY · FIREFLY · MAD MEN · SEINFELD · SHERLOCK · STAR TREK · THE WALKING DEAD · X-FILES
100 GREATEST TV SHOWS
Of All Time
FROM THE MAKERS OF FILM and SFX
HORROR
STRANGER THINGS
Journey back to the Upside Down
INSIDE GAME OF THRONES
DRAMA
BREAKING BAD
Revisit the show that broke all the rules
THE CAST ABOUT LIFE IN THE SEVEN KINGDOMS
THE WIRE
THE TWILIGHT ZONE

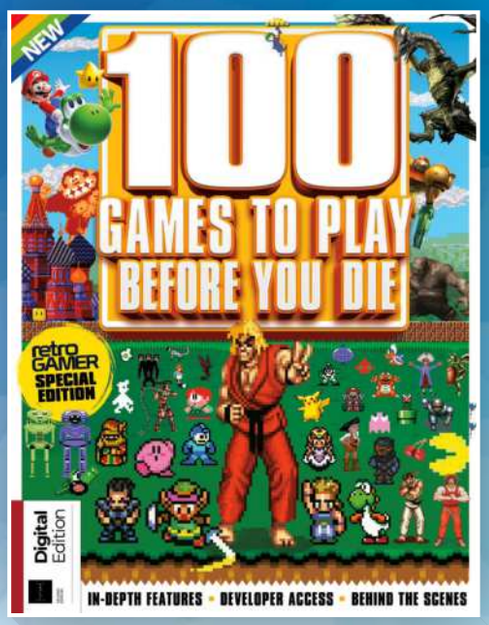
Find your next obsession in the definitive guide to unmissable television

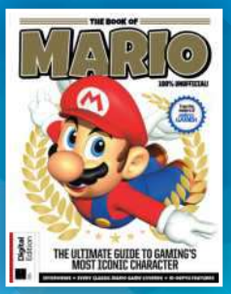


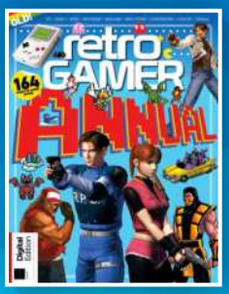
Get great savings when you buy direct from us

1000s of great titles, many not available anywhere else

World-wide delivery and super-safe ordering







THERE'S A BOOKAZINE FOR EVERYONE

Whether you're a film buff, an avid gamer, or love all things sci-fi, we've got you covered with our range of entertainment titles

Rediscover some of the greatest movies ever made

Follow us on Instagram @futurebookazines

FUTURE

www.magazinesdirect.com

Magazines, back issues & bookazines.

SUBSCRIBE & SAVE UP TO 61%

Delivered direct to your door or straight to your device

Choose from over 80 magazines and make great savings off the store price!

Binders, books and back issues also available

Simply visit www.magazinesdirect.com

No hidden costs | Shipping included in all prices | We deliver to over 100 countries | Secure online payment

FUTURE

magazinesdirect.com

Official Magazine Subscription Store

retro GAMER

ULTIMATE RETRO HARDWARE GUIDE

DEVELOPERS CELEBRATE THE GREATEST GAMES MACHINES OF ALL TIME, FROM THE HUMBLE SPECTRUM AND ATARI 2600 TO THE ORIGINAL PLAYSTATION AND XBOX. LEARN ABOUT THE SYSTEMS THAT POWERED THE GAMES YOU LOVE

SYSTEMS CELEBRATED

Amiga 500
Commodore 64
Mega Drive
Xbox
PlayStation
ZX Spectrum
NES

HARDWARE HEAVEN

Dreamcast
Intellivision
Nintendo 64
Jaguar
Game Boy Advance
Amiga CD32
Saturn

ICONIC PERIPHERALS

Super Game Boy
Intellivoice
G-Con 45
Competition Pro
Light Phaser
Super Scope
NES Advantage

BOOKAZINE